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# ***JPRS Report***

# **Science & Technology**

***China***

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# Science & Technology China

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23 December 1991

### ERRATA:

In the special subtitled report on "High-Power Lasers & Laser Fusion Research" (JPRS-CST-91-019, 18 Oct 91) the following corrections should be made:

- p. 10, caption to Fig 3. should read "... on  $2\omega_0$  Probe"
- p. 10, Table 1, the SN ratio should read " $10^7$ "
- p. 10, Table 1, the pressure p (in Pascals) should read " $1.33 \times 10^{-3}$ "
- p. 12, captions to Figs. 7 and 8 should read "...Target Vs.  $\theta$ "
- p. 18, Table 2, the heading for the fifth column should read "Wavelength ( $\mu\text{m}$ )"
- p. 21, Table 4, title should read "... Angles for  $1\omega_0$  and  $2\omega_0$  Laser Beams"
- p. 21, Table 4, the heading for the second column should read "Wavelength ( $\mu\text{m}$ )"
- p. 21, Table 4, the heading for the fourth column should read "Focal-spot radius ( $\mu\text{m}$ )"
- p. 21, Table 4, the heading for the sixth column should read " $N_{2\omega}/N_{1\omega}$ "
- p. 21, caption for Fig. 8 should read "... of  $1\omega_0$  and  $2\omega_0$  Laser Beams"

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### Plans for Advanced Space Tech Launched

40100008 Beijing CHINA DAILY in English 12 Dec 91  
p 1

[Text] China's aerospace industry isn't shooting for the stars but instead is aiming a little closer to home, with plans for an advanced telecommunications satellite and a possible manned space shuttle in the future, according to a leading industry official.

China won't join in the competition for outer space expeditions, and mainly will rely on itself to advance its high technology in space, Liu Jiyan, Vice Minister of the Aeronautics and Astronautics Industry, said recently in Hong Kong. The ministry was holding a display there of the products it has developed in the past 35 years.

A manned space shuttle is in the preparatory research and study period, Liu said. Its future remains to be decided by the central government.

"We will make use of foreign investment, provided conditions are reasonable and loans have access to Chinese Government approval," the vice minister said.

In the past, the country hasn't used overseas funds for aerospace. The ministry obtained loans from the People's Bank of China to develop the powerful Long March 2-E launch vehicle, which will deliver two US-made telecommunications satellites for Australia next spring and autumn.

According to the ministry's schedule, a 24-transponder "Dongfanghong 3" telecommunications satellite, capable of covering all of China's land area, will be sent into space next year, the fifth to be launched since 1986.

### Aerospace-Oriented Software Certified

92P60048A Beijing ZHONGGUO DIANZI BAO  
[CHINA ELECTRONICS NEWS] in Chinese 11 Oct 91  
p 1

[Article by Liang Shu [2733 2118]: "Aerospace Vehicle Integrated Design and Manufacturing Software Package: AVIDM System Frame Software Certified"]

[Summary] The AVIDM (aerospace-vehicle integrated design and manufacturing) system frame software package developed by an [unnamed domestic] institute passed appraisal in Beijing on 28 September. This new software package, intended for all spacecraft—including weapons systems, launch vehicles, and satellites—runs on workstations and microcomputers, complies with internationally prevalent CAD integration requirements, and meets late-eighties international standards.

### Aerospace CAD/CAM Achievements Described

92P60062A Beijing JISUANJI SHIJIE [CHINA  
COMPUTERWORLD] in Chinese No 41, 23 Oct 91 p 1

[Article by Han Yun [7281 0061]: "Major Advances Realized in Space CAD/CAM General Research"]

[Summary] The aerospace-vehicle integrated design and manufacturing (AVIDM) system frame software package passed the technical appraisal held a few days ago in Beijing by the Ministry of Aerospace Industry (MAS). Also passing appraisal at the same time was the largest domestic finite-element structural analysis computer program—the JFX-1.

The AVIDM system runs UNIX and is built around the ORACLE database with 11 separate information bases; it also has an interface for the UG-11 graphics software package. It is intended to provide logical models for aerospace-vehicle design, and has been successfully run concurrently with five other types of software packages—for areas such as ballistics, aerodynamics, loading, control, and structural analysis. The system runs on a SUN workstation with a SUN-4/280 server.

The JFX-1 program, developed by MAS Institute 710 and designed as a general applications software package to be used with the AVIDM system, contains almost 200 functional modules for such tasks as static, dynamic, and structural stabilization analyses, nonlinear and thermal transmission/conductivity studies, and aeroelastic mechanics. The JFX-1 program runs on a SUN4 workstation under the UNIX operating system, and can be applied in non-aerospace areas such as shipbuilding, transportation, water conservation, construction, chemical engineering, and the nuclear industry.

**Missile Moment Load Simulator Developed**

92P60049A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 3 Oct 91 p 1

[Untitled photoreport by staff writer/photographer Liu Dong [0491 2767]]

[Text] Beijing Aerospace University professor Liu Changnian [0491 7022 1628] and his colleagues in the Automatic Control Department have developed a guided-missile moment load simulator. This apparatus's tracking accuracy and anti-jamming ability both exceed those of similar foreign-made products; moreover, this 1980's-level simulator is smaller in physical volume and lower in manufacturing cost. The photograph shows engineers using the new equipment to measure aerodynamic loads on the control surfaces of a missile in simulated flight.

**Domestic, Foreign IR Guided-Missile Hardware-in-the-Loop Simulation Technology Assessed**

92P60074A Beijing ZHONGGUO HANGTIAN [AEROSPACE CHINA] in Chinese No 10, Oct 91 pp 11-15

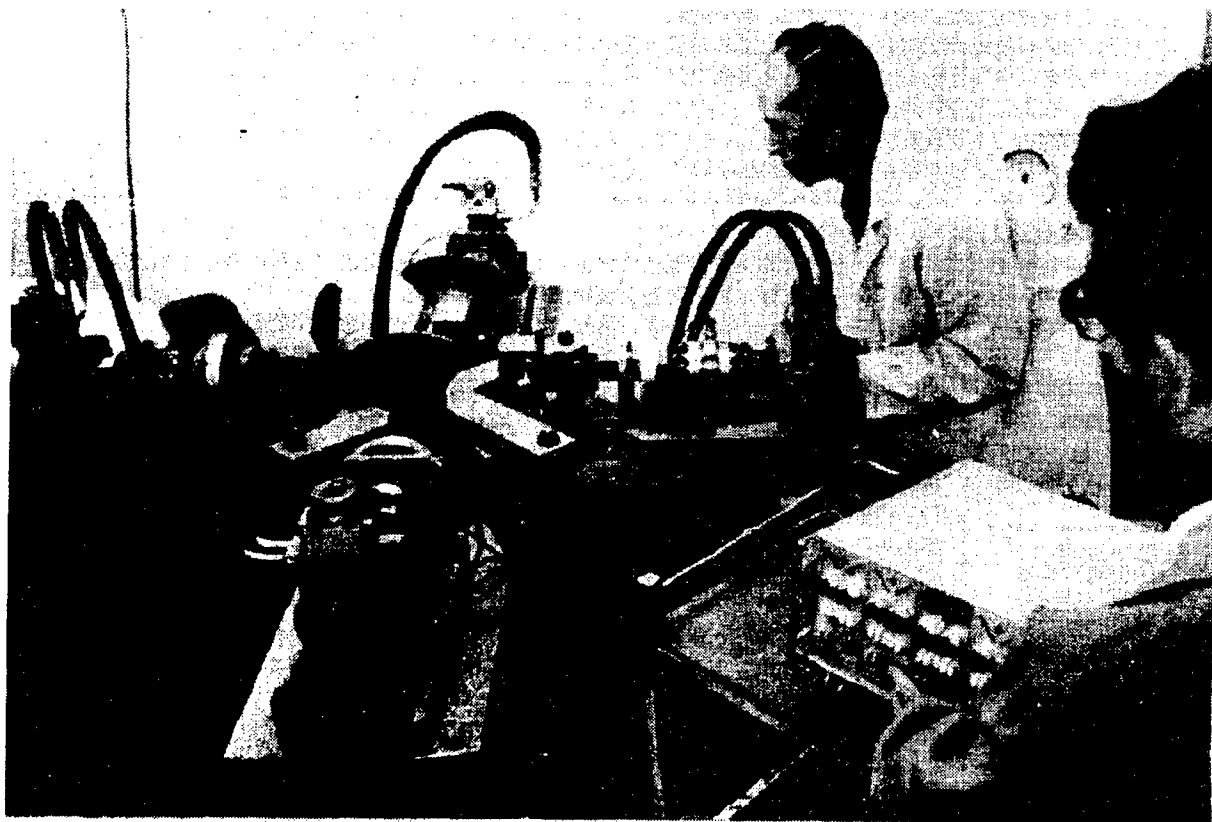
[Article by Li Chunming [2621 2504 2494] of the Beijing General Research Institute of Electronic Engineering:

"Domestic, Foreign Infrared-Guided Weapons Systems Hardware-in-the-Loop Simulation Technology Assessed"]

[Excerpts] [Abstract] The technologies and developing trends of hardware-in-the-loop (HITL) simulation of first- and second-generation heat-point-source-seeking infrared (IR) guided missiles and third-generation IR-imaging guided missiles abroad are described. Introduces some IR simulation facilities, including the Infrared Simulation System (IRSS) at the U.S. Army's Advanced Simulation Center (ASC), and the IR imaging technologies of resistance element array, film visible light/IR image conversion, laser scanning VO<sub>2</sub>, thin-film modulation, and liquid crystal modulation. The development of IR guided-missile HITL simulation technology in China is also presented. [passage omitted]

**III. Survey of Domestic Development of IR-Guidance HITL Simulation Technology**

Not long after China began development of first-generation IR AAMs and SAMs in the 1970's, the nation's researchers got their own facilities for IR-guidance simulation experiments, but this initial-phase equipment was relatively primitive. In the 1980's, after development of improved first-generation models and



Missile Moment Load Simulator in Use

second-generation weapons and based upon model requirements, the nation entered a period of rapid development in overall system technology for HITL simulation of optoelectronically guided weapons, in target/environment simulation technology, and in technology for simulator development. At present, domestic facilities can satisfy the HITL simulation needs not only of the nation's first- and second-generation IR homing guided missiles, but also those of similar foreign-made weapons systems. According to the individual characteristics of simulation for the various types of weapons systems, some of the domestic equipment use a compression-ratio model method and a parallel collimator method, some use a large ellipsoid screen scheme, and some use relatively advanced "optomechanical" system. Representative of such facilities, which vary a great deal

based on the task, is the Beijing Simulation Center, part of the nation's Ministry of Aerospace Industry (MAS).

Also, following upon the development of weapons using IR imaging guidance, China is now studying mechanisms for IR target/environment imagery simulation technology and basic applications; breakthroughs have been made in some key technical areas. In research on computer image generation (CIG) technology, on visible-light/IR signal-converter technology, and on various IR target/environment imagery simulation techniques, the nation has embarked on its own developmental path. Several projects—involving technologies such as target/interference/background simulation, construction of models and databases for IR target/environment specific features, new algorithms, and applications software for simulation engineering—have reached the [international] state-of-the-art. [passage omitted]

**Large-Diameter Semi-Insulating InP Monocrystal Developed**

92P60063A Beijing ZHONGGUO KEXUE BAO  
[CHINESE SCIENCE NEWS] in Chinese 29 Oct 91  
p 1

[Article by Liu Maosheng [0491 5399 0524]: "Large-Diameter Semi-Insulating Indium-Phosphide Monocrystal Unveiled: Critical Material for Optoelectronic Very-High-Speed Integrated Circuits"]

[Summary] The CAS Institute of Semiconductors recently succeeded in fabricating 50-mm-diameter semi-insulating InP monocrystal as part of the state "863 Plan" high-tech development program. This critical substrate material for optoelectronic communications, VHSICs, and other high technologies, permits realization of low-noise, high-power, high-frequency, radiation-hardened optoelectronic and microelectronic devices, and in some respects is superior to GaAs as a substrate material. This late-1980's-level material has been put into small batch production (5-10 kg annually).

### Foreign Investment Sought in Field of Biotechnology

40101007A Frankfurt/Main FRANKFURTER  
ZEITUNG/BLICK DURCH DIE WIRTSCHAFT  
in German 15 Oct 91 p 8

[Text] In the field of biotechnology, the PRC has a great deal of catching up to do. To be sure, the country is lagging behind in its economic and industrial development. Still, it might be smart for countries of the Western world to devote some attention now to the PRC, as an interesting partner in the field of biotechnology. Han Ying-Shan, professor and biotechnology advisor at the Wuhan Institute of Botany which belongs to the Academia Sinica, propounded this view in the English-language journal BIOTECHNOLOGY (Vol IX, p 711).

The PRC has a good foundation in biotechnology research; thus, cooperative ventures are possible. Moreover, Ying-Shan feels that the PRC represents a potential market of gigantic proportions for biotechnology products. Heretofore, only a few Western biotechnology enterprises have entered into joint ventures with Chinese partners. Some examples of these are:

- cooperation between the Chinese Institute for Atomic Energy and Australia's Biomedical Systems, which collaboration is developing diagnostic media on the basis of enzyme-linked immunoassay (ELISA) tests;
- the Beijing Institute for Biological Products and Merck Sharp & Dohme, which are collaborating to produce a recombinant hepatitis-B vaccine;
- the Shanghai Center for Biotechnology and the Canadian International Hemoglobin Technology Division which are developing substitutes for blood; and
- the firms Ningbo Abbott Biotechnology and Sino-American Biotechnology which are marketing pharmaceuticals, restriction endonucleases and polymerase chain reaction (PCR) methodology.

One of the principal difficulties facing the expansion of cooperative ventures with Western firms is the language. To be sure, more and more young Chinese researchers are adequately skilled in the English language; but, according to Ying-Shan, this does not hold for businessmen. Apart from that, potential partners for joint ventures and even qualified scientists are quite a rarity in the PRC.

However, the Chinese state is making it easy for foreigners to generate interest in joint undertakings. This includes a considerable tax break. The corporate tax amounts to only 15 percent in special industrial areas and coastal cities but can go as high as 24 percent in other industrial regions. In addition, over the first three years, biotechnology firms engaged in joint ventures are not obliged to pay income taxes.

Agriculturally-oriented biotechnology could be especially interesting for Western firms. Since the early

1980s, the PRC has garnered extensive experience in the cultivation of useful and decorative plants from plant tissue, cf., meristem cultures. Using these techniques, new varieties of bananas were grown in the PRC and poplar trees were also cultivated in large numbers.

With its liberal regulations regarding the handling of genetically altered fauna and flora, the PRC hardly appears restrictive. Thus, virus-resistant strains of tobacco and resistant strains of potatoes, produced via genetic engineering, are currently undergoing tests in the outdoors. Now, above all, the PRC needs foreign capital in order to accelerate the progress of its development in the field of biotechnology.

### Strategy of Military Medical Science and Technology in 1990's Outlined

91FE0836 Beijing RENMIN JUNYI [PEOPLE'S  
MILITARY SURGEON] in Chinese No 7, 27 Jul 91  
pp 3-5

[Article by Qi Xuejin [7871 1331 6651] of the All-Army 5th Medical Science and Technology Commission Plenary Session: "Seize Opportunities, Face Challenges, Push China's Military Medical Science and Technology to a Higher Level"]

[Text] The All-Army 5th Medical Science and Technology Commission Plenary Session was held from 7 to 11 May 1991 in Beijing. The central topic of the meeting was to summarize the Seventh 5-Year Plan, make deployments for the Eighth 5-Year Plan, and plan medical S&T work for the next 10 years. Leading comrades from the CPC Central Committee, State Council, Central Military Commission, and three General Departments of the PLA paid extremely close attention to this meeting. Jiang Zemin, Yang Shangkun, Yang Baibing, Qin Jiwei, Song Jian, Chi Haotian, Zhao Nanqi, and other leading comrades from the party, state, and military personally met with delegates to the meeting and fully embodied the high level of attention toward S&T work from the CPC Central Committee, State Council, and Central Military Commission.

During the meeting, director Zhang Liping [1728 4539 1627] gave a work report on behalf of the 4th Science and Technology Commission and deputy directors Zhang Wenkang [1728 2429 1660] and Lu Zengqi [7120 1073 4388] provided reports and explanations of, respectively, the situation in implementation of the Seventh 5-Year Plan and the situation in compilation of the Eighth 5-Year Plan program and 10-year development strategy. Democratic consultation and election created the 5th Medical Science and Technology Commission and it studied and passed the organizational programs of each special group. General Logistics Department director Zhao Nanqi, political commissar Zhou Keyu [0719 0344 3768], and deputy director Liu Mingpu [0491 2494 3877] gave important speeches.

Director Zhao Nanqi fully confirmed that the all-army medical S&T staff is a staff that is particularly top

quality, especially capable of fighting, and entirely trustworthy. He highly praised the role of elderly experts as founders and developers in the development of medical S&T in the PLA and their role in storming, their role as "human staircases", and their role as model leaders. He emphasized that military medical S&T work has adhered to the direction of serving the army as a "surname army", doing prominent research on military medicine and preventive medicine, giving primacy to respect for and training of personnel, working well at macro policy-making and unified leadership, and working hard to maintain and foster the spirit of seeking truth, offering with respect, innovation, and arduous struggle.

Political commissar Zhou Keyu stressed that in order to reinforce medical S&T staff construction, we must further adhere to the party's policies concerning intellectuals and form an excellent practice of "respecting knowledge and respecting skilled personnel". We must be concerned with ideological construction and focus on education in patriotism. We must fully foster the backbone role of elderly experts and enthusiastically support healthy growth of middle-aged and young cadres. We must reinforce unity and cooperation, and foster the overall advantages of our medical S&T staff.

Deputy director Liu Mingpu provided a systematic description of the major problems in ten areas of that must receive a high degree of attention and efforts at solution in developing medical S&T work during the Eighth 5-Year Plan and over the next 10 years.

1. Fully recognize the important strategic status of S&T in national and military construction, give primacy to developing medical S&T in military health modernization and construction. With the surging development of medical S&T, new changes are now occurring in modern medical models, new transformations are occurring in research contents and patterns, and the development of medical science is facing new breakthroughs. These things pose serious challenges to the development of medical S&T in the Chinese military. We certainly must clearly understand the situation, work with a will to make the country strong, actively keep forging ahead, and boldly greet the challenges of the new technological revolution.

2. Correctly analyze the standpoint of military medical S&T development, serve as a link between past and future, carry forward the cause and forge ahead into the future, carefully plan goals of struggle and overall blueprints. Major progress was made in military medical S&T during the 1980's, especially during the Seventh 5-Year Plan, but many problems and weak links persist. Planning and preparing for the development of military medical S&T during this century must be based on correct analysis of the current situation, based on the central tasks that guide military strategy during the new period, based on reality, a focus on development, unified planning with due consideration for all concerned, seeking truth from facts, scientific compilation of development strategies, correct formulation of goals of

struggle, and careful design of overall blueprints to truly establish objectives of a truly feasible foundation.

3. Resolutely serve the military, have a correct orientation of service to war preparedness, orient toward the main battlefields in military modernization and construction, place military medicine and preventive medicine in a prominent position. Military medical S&T work must adapt to the requirements of military construction, so ensuring the health of the military and improving the fighting strength of the military must be the starting points and standpoints of medical scientific research. They must serve as the basic foundation for dealing with the relationships among each category of research and serve as the basic yardstick for evaluating research work achievements. Moreover, this should be the concern when deciding on objectives, planning tasks, deploying forces, and mobilizing all medical S&T personnel to enthusiastically dedicate themselves to the main battlefield, consciously seek topics for practice in military modernization and construction, and search for tasks on the first line of prevention, treatment, and health care. They must focus on research in military medicine and preventive medicine, continue to sustain the momentum in clinical medical research, and better serve military modernization and construction.

4. Correctly deploy basic, applied, and developmental research, form a rational and scientific research configuration, maintain sustained, stable, and coordinated development of military medical scientific research. We should give preference to the development of research on applied technology. Raise starting points, open up and broaden realms, strengthen innovation, strive to provide more advanced new technology, new methods, and new equipment for military peacetime and wartime health service. We must actively track and develop high-tech research. Adhere to the guiding ideology of "aiming at forward positions, active tracking, limited objectives, and focused breakthroughs", carefully deploy research work for the four levels of tracking research, attacks on key technical problems, target products, and applied projects. Focus on the three issues of grasping key breakthrough points, promoting the permeation of high technology into the military and preventive medical realms, and drilling and training skilled personnel. We must strengthen basic research in a focused way. Select fields that play a leading role in medical development, that are closely related with military medicine, where China's military has significant advantages, and where we can enter the vanguard of the present age. Form research directions where we have obvious superiorities and advantages, and establish several high-quality research base areas that can push into the leading edge of modern science. We must stress developmental research. Focus on laboratory development, design and trial manufacture, intermediate testing, technical services, extension and application, and other primary links, strive to place achievements into the realm of production, promote their conversion into real benefits, and promote benevolent cycles in scientific research work.

5. Intensify reform of medical S&T work, promote the integration of S&T with prevention, treatment, and health care work, establish vigorous and effective operational mechanisms for scientific research. We must make whether or not something helps in adherence to the direction of service to the military, whether or not it benefits the development and progress of military medical S&T, and whether or not it benefits motivating the initiative and innovative spirit of all medical S&T personnel a primary principle in guiding S&T reform. We must make major efforts to strengthen the extension and application of achievements and promote the output, dissemination, and permeation of achievements, especially high and new technology achievements, into basic-level health organs. Continually perfect scientific research mechanisms and S&T policies, open up the technology market, reinforce macro coordination and control, and fully foster the overall functions of military medical S&T work.

6. Fully foster the comprehensive advantages of military medical S&T staffs, focus on breakthroughs, and cooperate in attacks on key problems. Adhere to an optimized structural combination that has objectives as its center, tasks as its bond, and topics as its key elements, rationally deploy forces, and ensure the achievement of overall objectives. Adhere to correct tactics for cooperative attacks on key technical problems, shrink battle-lines, take aim at forward positions, raise starting points, and focus on breakthroughs. Increase spans and jump over stages. Have crack staffs and form "fists". Reinforce information measures and work on good information exchange. We must strengthen the scientific nature, authoritativeness, and manipulability of planning. Attacks on key problems in all large units should be included in overall plans to reduce low-level repeated research and achieve a comprehensive reinforcement of the entire army's capabilities for cooperative attacks on key problems. We must deal correctly with the relationships among all types of interests, achieve fairness, objectivity, and accuracy, and help unity and motivating initiative. Firmly establish the ideology of "a single chess board" [comprehensive arrangements] for the entire army, advocate the partial serving the whole, the short-term serving the long-term, the part serving the whole, working as one, and moving toward good cooperative attacks on key problems in this "big chess game".

7. Adhere to the principle of relying on our own efforts, focus on using the raising of our own research capabilities as a foundation, actively promote cooperation and exchange with the outside world. We must place our standpoint on doing our own research and rely on ourselves to go all out, explore, and discover. Resolutely rely on our own efforts and make ourselves the primary factor, but do not eliminate opening up to the outside world. We must strive to open up and broaden the realms of cooperation and exchange with the outside and use adherence to principles as a foundation for doing more work, improving environments, taking the initiative in making attacks, and opening up the situation. At

the same time, we must be concerned with reinforcing domestic cooperation and exchange.

8. Solidly establish an ideology of doing scientific research in a hardworking and thrifty manner, use multiple channels to reinforce S&T investments, strive to create excellent conditions for S&T personnel to display their talents. Actively progress in resolute restraint, make attempts by overcoming difficulties, and make stable advances on existing foundations. Bring every positive factor into play, use multiple channels to strengthen scientific research investments. All large units should set aside a certain proportion of their reserve funds and production income for investment in scientific research. Scientific research units should set aside a portion of their scientific research development funds and income from opening up to the outside to improve scientific research conditions. All colleges, schools, and hospitals should invest a substantial part of their income from opening up to the outside in scientific research. Reinforce scientific management, optimize investment structures, prepare detailed accounts, increase income and reduce expenditures, and foster optimum returns to limited investments. We must place our standpoint on a foundation that can endure it, scientifically determine development speeds, scales, and proportions, and sustain appropriate development of military medical scientific research.

9. Make personnel training an urgent task, strive to train and create a large number of medical scientists and technical experts to span the centuries, establish a medical S&T staff that has a high degree of political consciousness and powerful innovative capabilities. Straightening out ideas for personnel training must be based on the future development of military medical S&T staffs, circumspection and farsightedness, and leading ideas. It must also be based on analysis and careful consideration of the current situation in our military medical S&T staff and on immediate planning. This requires determination of high-standard personnel training objectives and it requires an optimum environment for personnel growth. It requires fully fostering the role of elderly experts and elderly professors, and it requires initiating and fostering the spirit of painstaking progress. The younger generation is the future and hope of the cause of China's military medical S&T and health and they must certainly recognize the historical responsibilities they themselves must bear. Use the spirit of "burning fat and oil to extend the time and eternally striving year after year", working with perseverance, keep fighting despite repeated setbacks, and make their own contributions to the cause of China's military medical S&T.

10. Inspire spirit, implement resolutely, truly push the cause of China's military medical S&T to an even higher level. The period from 1991 to 2000 is an extremely important decade for progress in development of the cause of China's military medical S&T. Health leaders at all levels must certainly have a spirit and state of rousing

themselves to move upward and an awareness of progressing through tenacious effort, improve macro planning capabilities, and make an effort at every level in resolute implementation. All medical S&T personnel in the entire army must have a sense of mission, a sense of responsibility, a sense of urgency, and a sense of glory in establishing meritorious service to the cause of China's military medical S&T, engage in arduous struggle, unite to advance, go all out, and work hard to attack key problems. They should use their own remarkable work achievements, create new outstanding achievements that have no qualms about eras and history, and rebuild new meritorious services to the cause of China's military medical S&T.

### Academy of Military Medical Sciences

#### Institute of Biotechnology

92FE0116A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 29 Sep 91 p 2

[Article by Gao Jinzhong [6750 2516 0022]]

The Institute of Bioengineering Research, created 8 years ago, is hot on the trail of international developments in biological high technology, and actively spreads high-tech biology results that have notably benefitted the economy and the society.

Hepatitis-B is one of China's high-incidence epidemics that has a serious impact on the health of the people. A prompt and accurate diagnosis is very important in the prevention of hepatitis-B. Based on the accomplishments of this institute working in cooperation with the basic research institutes on gene engineering high-efficiency expression which earned the national 1st-class award for scientific advancement, its series of hepatitis-B ELISA diagnostic kits were developed. The kits have been used in the examination of over 20 million people in China and proved to have an overall effectiveness rate of between 95 and 99 percent. The kits are being used by customers in over 24 provinces, municipalities and autonomous regions. It has become the first widely applicable commercialized genetic engineering product in China, and it is being used extensively to prevent the spread of hepatitis.

The institute took on the Seventh 5-Year plan project for a "genetically engineered vaccine for piglet diarrhea". After research was completed successfully in the laboratory, the vaccine was immediately put into intermediate test, and was tested on 50,000 sows and 300,000 piglets on over 10 pig farms in Beijing, Tianjin, Shaanxi and Hunan, with protective effectiveness of over 90 percent, greatly raising the life expectancy of piglets. This vaccine joined the advanced international ranks and received new biological product certification, thus becoming China's first bio-engineered vaccine to be certified for veterinary medicine.

A key project of the national Seventh 5-Year Plan for new drugs to prevent tumors and infections, "recombinant Interleukin-2", was achieved by the Chinese Academy of Sciences' Institute of Biochemistry, and an international advanced-level laboratory result was awarded, the intermediate test was then jointly conducted by the Bioengineering Institute of the Academy of Military Medical Sciences. After 2 years of concerted effort the intermediate test technology was perfected, and the expression of engineered bacteria was raised to about 60 percent. The established purification technology was simple and reliable, the degree of purity was up to 98 percent, because its 22 quality indicators were all up to nationally stipulated standards, the product was approved for clinical test, and that was good news for tumor and hepatitis sufferers.

This institute which collectively pursues genetic, cell, and fermentation engineering, has undertaken many national and military key research tasks, and has earned national advanced level scientific research achievements, including six national S&T advancement awards, one national invention award, and five citations for military awards of 2nd class and above. From start to finish the institute upholds the leadership tenet of directing scientific research to serve the people's economic construction, and striving to turn practical S&T into production power.

#### Institute of Information Research

92FE0116b Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 29 Sep 91 p 2

[Article by Huang Chinling [7806 2504 5044]]

The Institute of Information Research which is responsible for supplying S&T information for all military medical research and armed forces medicine and health, has completed its task of over 100 special information studies, of which more than 20 received various citations. Among them, the "wartime special weapons medical protection information research" earned a 1st-class national level S&T information achievement award.

The all military medical information center's "guardian" with over 20 high-grade information personnel is the only unit in the military medical and health system offering S&T information specialists master's degrees, and this year they have graduated over 10 medical information specialist master's degree students.

To supply strategic military medical information materials to the leadership; to supply tactical information materials for military science research and major scientific research tasks; to supply special intelligence services and information consultative services for scientific research, teaching and clinical practice, the institute has become the hub of the military medical information network. Now, this institute has joined a network of over 500 information library organizations inside and outside of China, and has accumulated over 5,500 resource materials, 1,500 product samples, including over 150

kinds of cells and bacterial strains. Its prompt and accurate supply of information has resolved key questions on many S&T topics, has helped scientific research to proceed smoothly and bring about many research achievements.

The "Chinese Journal of Applied Physiology", "PLA Medical Information", "Journal of Military Medical Sciences Academy", and "Foreign Medicine, Volume of Military Medicine" published by this institute are distributed throughout the country.

The optical look-up system that was first imported for use throughout the military services has developed toward a unified "terminal-storage-network", an all military medical information network with international connections is being built; and this institute has been approved by national authorities to be the investigative element for the initial granting of invention awards.

#### **Institute of Microbiology and Epidemiology**

92FE0116A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 29 Sep 91 p 2

[Article by Jiang Hong [3068 4767]]

The Institute of Microbiology and Epidemiology is a military medical S&T research unit that specializes in research on microbiological examination, decontamination, medically vectored biological defense, and common epidemics. It is a comprehensive and specialized S&T element of quite high academic standards, and has several specialists who are not only well-known in China, but are also quite influential internationally. For many years this institute, under the leadership of the party committee and guided by specialists who have worked unselfishly throughout their entire lives, has made achievements in scientific research in bacterial and viral microbiological examination, classification and determination of medical insects, decontamination, extermination of insects and rodents, and prevention of common diseases, all of which have been scientifically sound, academically deserving, and very beneficial to the society and the economy. From 1980 to 1990 this institute received one national S&T advancement special-class award, eight awards of 3rd-class or above, one national 2nd-class natural science award, one 1st-class national invention award (previously there had been no 1st-class award granted in Chinese pharmacology), five 3rd-class awards or above, and 110 military S&T advancement awards, including many achievements that were of advanced level inside and outside of China. The institute also made the first discovery of Lyme disease in China or Asia.

In order to understand the background situation of local epidemics the scientists and technicians of the institute conducted major studies, made on-site investigations, and collected and compiled reference materials. At the same time, they turned over military material for public use, and conducted research on rat and mosquito pestilence, and hepatitis and hemorrhagic fever epidemic.

They were quick on the scene to combat any problems signalling disaster, sent diagnostic drugs to the hepatitis epidemic in Shanghai; and used armed forces border defense units as their test sites. They counterattacked in self-defense, and put down antirevolutionary uprisings, resolutely carried out assignments from the top leadership, and directed and participated in military unit and local epidemic prevention work. In the last 40 years the evidence of their presence is everywhere: at Daxinganling in Heilongjiang, Altay in Xinjiang, the Xisha Archipelago, the Sino-Indian border, Zhenbao Island in Heilongjiang, the offshore islands, Yining and Kashi in Xinjiang, and elsewhere. Lyme disease sufferers were treated and cured; officers and men at border defense posts were no longer suffering bites and stings of mosquitos and grasshoppers; rat infested cities became the front lines in nationwide disaster defense; and there is now a new drug for malarial disease, which only a few years ago was considered incurable.

#### **Institute of Pharmacology and Toxicology**

92FE0116d Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 29 Sep 91 p 2

[Article by Sang Ning [2718 1337]]

In the last year news kept pouring forth from the Institute of Pharmacology and Toxicology that brought hope to those suffering from disease. In October, after the opium derivative antidote—Naloxone Hydrochloride (Narcan) injection—an exceptional antidote and analeptic for overdoses of anesthetics and analgesics, had earned new-drug certification, it was put into production, and ended China's history of dependence on costly importation of this type of drug.

After the indomethacinum ointment, used for inflammation from rheumatism and rheumatoid arthritis, sprained joints, and damage to soft tissues, earned the 2nd-class military S&T advancement award, it again received the 3rd-class national S&T advancement award, and it is now in batch production.

After the jielin [6043 4340] antitoxin used in organophosphorous fertilizers poisoning that is so effective against toxins came into wide use in Hunan, the success rate of the towns' and villages' health departments' rescue success rate went from 20 percent to 96 percent, and the people now call it the "soul revivor". In May of this year, the Ministry of Public Health regarding it as this year's major pharmaceutical hygiene S&T achievement has made it available to rural villages and basic levels throughout the country.

On 30 July of this year, the Ministry of Public Health at a news conference held at the Great Hall of the People announced the promotion of a drug to military and non-military circles that up to now was little used in the world, a strong and safe analgesic—dihydroetorphine. Its equivalent dosage is only one to one-thousandths that of morphine and one to five-thousandths that of dolantin [Pethidine or Meperidine].

It has been learned that this institute has another new drug undergoing clinical reporting and evaluation, and is being clinically tested.

This research institute is one of China's important organizations especially engaged in toxicological and pharmacological research, and it is also the main research unit in the military new drugs evaluation center. It has established national post-doctoral pharmacology scientific research mobile stations. It is its comprehensive and formidable S&T force and its multidisciplinary development that makes this institute achieve so prolifically in the toxicological and pharmacological aspects of new drug research. As of 1990 they scored more than 120 S&T achievements, and received 90 awards, including six national invention awards, one national natural science award, more than 10 national S&T advancement awards, and over 20 military awards of 2nd-class or above.

#### Experimental Animal Center

92FE0116e Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 29 Sep 91 p 2

[Article by Yu Haiying [0060 3189 5391]]

In the western suburbs of Beijing there is a little known military "zoo" which is the Academy of Military Medical Sciences' experimental animal center. Here rats, mice, guinea pigs, ground squirrels, rabbits, monkeys, and English beagles, altogether, more than 20 types of laboratory animals, are raised, not only to supply research units in and outside of the military, but for export to the U.S., Japan, and Germany for a total receipts in foreign exchange amounting to hundreds of thousands of U.S. dollars.

Laboratory test animals are called the "living reagents" or "living instruments" of medical research. They are indispensable substitutes for human beings, and they have distinct biological characteristics and quality standards. The center has established a management system for microbiology, genetics, nutrition technology monitoring methods, and for rearing, quarantine, and environmental controls, and thereby has effectively guaranteed the quality of their lab test animals. Now the center is propagating over 200,000 animals per year, and is supplying lab animals at national standards to over 90 units in more than 10 provinces, municipalities, and autonomous regions.

This year the center is actively engaged in S&T research on lab animals, focusing on standardization of lab test animals, and the rearing of new forms of animals. It has separate efforts on rearing and propagation technology, biogenetics and breeding, embryo freezing and storage, using wild animals as lab animals, holistic biology, microbiological examination and survey, extermination, and feed nutrition. Among these, the technology for freezing and storage of mouse embryos is up to the national advanced level. Their ability to raise black

hamsters and mutate them into white lab animals is unique in the world, and has caused great interest and attention internationally.

#### Sihuan (Four-Ring) S&T Development Center

92FE0116f Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 29 Sep 91 p 2

[Article by Zheng Xuan [2398 1357]]

The California AIDS Prevention Center arranged for 18 AIDS sufferers to take a highly effective immunity function enhancement prescription made up from traditional Chinese medicine. Of the patient's immunity function indicators, 70 percent showed a marked increase and 20 percent showed no diminution. This Chinese medicine, called "Hongbao" (precious red), approved for this one-time clinical test, came from the Academy of Military Medical Sciences' Sihuan S&T Development Center.

In order to quickly convert scientific research achievements into production strength for the society and for armed forces' combat strength, the Academy of Military Medical Sciences persistently carried out S&T organizational structure reforms, pursued the "double track system" for scientific research and opening up management, and recently established the Beijing Sihuan S&T Development Center with its special emphasis on high-tech products in the life sciences field. The Beijing Sihuan Pharmaceuticals Factory, Beijing Sihuan Biological Products Factory, etc, as a group of S&T enterprises, formed an S&T cadre of over 100 individuals into an S&T development corps in order to coordinate industry and trade for scientific research.

It is the aim of the Academy of Military Medical Sciences to give first place to military and social interests in the development of S&T services. The "Sihuan (Four Ring)" enterprises, taking technology trade as the link to national economic development needs, and relying on the advantages of the Academy of Military Medical Sciences, organized research for development, production, and management of pharmaceuticals and bio-engineered products, medical treatment and health care products, chemical and S&T products for environmental monitoring. Now, over 100 S&T achievements from armed forces facilities and commercial products managed by the military have been given to the society.

A sound organization structure, administration, smooth relationships, observance of the law, and always perfecting its S&T development administrative system, the academy has initially established its goal of "four cycle", which is to create an excellent environment within the Academy for scientific research to strengthen cooperation within the military, to strive to further medical, training, research coordination; and in facing the main battleground of economic construction, to positively participate in the national economic development environment, to develop high-tech enterprises, and to participate in international economic environment.

**Purification and Analysis of a HeLa Cell Receptor Protein for Coxsackievirus B**

40091004B Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 5, Oct 91 pp 306-309

[English abstract of article by Xu Ruliang [1776 1172 5328], Mu Guifan [3092 2710 5672], et al. of the Faculty of Basic Medicine, The Peking Union Medical College]

[Text] A HeLa cell plasma membrane receptor protein for Coxsackievirus B group (CBV) was purified from the 0.2 percent deoxycholate (DOC)-solubilized debris of plasma membrane on the CNBr-activated Sepharose-4B column coupled with McAb R<sub>6</sub> against the receptor for CBV on HeLa cell. Analysis by sodium dodecyl sulfate polyacrylamide gel electrophoresis of the purified protein revealed two bands with molecular weight of approximately 56,800 dalton and 70,800 dalton, respectively, which were thought to be two subunits in a receptor protein. The polyclonal antibody (PcAb) induced by the purified protein in BALB/c mice could specially inhibit infection of CB<sub>2</sub>, <sub>4</sub>, and <sub>6</sub> virus to HeLa cell, which suggested that the purified protein really beared receptor activity. In immunoblotting assay of the DOC-solubilized HeLa cell plasma membrane and purified protein, only two bands were shown in each sample with staining of PcAb. The result implied that the isolated receptor protein was a specific molecule on HeLa cell plasma membrane. Reviewing the previous reports, we suggest that there should exist at least three distinct receptors for CBV on HeLa cell (HR<sub>1</sub>, HR<sub>2</sub> and HR<sub>3</sub>) and the protein purified here different from other two isolated receptor proteins for CBV would be a molecular basis constituting the third kind of receptor for CBV on HeLa cell.

**Purification and Characterization of Fragment B of the N-Terminal Half of the Heavy Chain of Tetanus Toxin**

40091004C Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 5, Oct 91 pp 310-314

[English abstract of article by Lei Dianliang [7191 3013 5328] of the National Institute for the Control of Pharmaceutical and Biological Products, Beijing, and Morihito Matsuda of the Research Institute for Microbial Diseases, Osaka University, Japan]

[Text] The N-terminal half of the heavy chain of tetanus toxin, fragment B, was purified for the first time. First, tetanus toxin was isolated from the culture filtrates of *Clostridium tetani*. Fragment AB, derived from the papain treated toxin, was prepared by high performance liquid chromatography. Fragment AB was dissociated by treatment with 100 mmol/L DTT and 2 mol/L urea. Fragment B was separated from fragment A by ion

exchange chromatography on a Mono Q column equilibrated with 20 mmol/L Tris-HCl buffer pH 7.6 containing 2 mol/L urea and 1 mmol/L DTT and eluted by linear increasing of NaCl molarity (0-0.5 mol/L). Purified fragment B was obtained in two forms, migrated as a single protein band with the same molecular weight of 48,000. The pI of fragment B was 7.3 and 6.7 respectively. The recovery of fragment B from fragment AB was about 50-72 percent. Fragment B was not toxic in mice at doses up to 100 µg, but it formed ion channels in a lipid bilayer by a patch clamp technique. The relationship between the channel formation of fragment B and the internalization of toxin to nerve cell was discussed.

**Studies on Purification and Immunogenicity of Nucleocapsid Proteins of EHFV**

40091004E Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 5, Oct 91 pp 319-323

[English abstract of article by Wang Lingshu [3769 7227 2873], Ni Dashi [0242 1129 4258], et al. of the Anhui Institute of Medical Sciences, Hefei; project supported by the National Natural Science Foundation of China]

[Text] McAb A<sub>35</sub> against EHFV-NP was linked to sepharose 4B to carry out affinity chromatography (AC) for purifying partially-purified HAN antigens. The AC-NP was further purified by HPLC. It was confirmed that HPLC-NP was EHFV specific with sera and McAbs by indirect-ELISA, and its M. W. was 50 kD manifested in SDS-PAGE. But the properties of different strains were not completely consistent. A<sub>9</sub>-NP had HA activity, but Chen, R<sub>22</sub>-NP were not. NP of three strains were used to immunize BALB/c mice with microimmune method. The results showed that neutralizing antibody could not be detected in immunosera of any strain. Cross HI, RPHI indicated that there were cross antigen binding epitopes in NP. The protecting test of golden hamster (GH) with Chen-NP confirmed that NP-Ag could induce protective effect in animals.

**Studies on the Reverse Transcription and Subsequent DNA Amplification of Dengue Virus Genome**

40091004F Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 5, Oct 91 pp 324-326

[English abstract of article by Qin Ede [4440 6759 1795], Yang Peiying [2799 0160 5391], et al. of the Institute of Microbiology and Epidemiology, Academy of Military Medical Sciences, Beijing; project supported by National Natural Science Foundation of China]

[Text] A simple, specific, and sensitive method was developed whereby dengue virus RNA was reversely transcribed and the resulting cDNA was amplified by

using Taq DNA polymerase. Two oligonucleotide primers were synthesized complementary to the sense and anti-sense strands of dengue virus NS1 gene, and they were about 539 nucleotides apart. The sequences of NS1 gene corresponding to the primers were highly conservative in the dengue viruses of four serotypes.

Dengue 2 virions, from the culture medium collected from C6/36 cells infected by virus were associated with their specific antibodies. The viruses associated were treated with a buffer solution containing Triton X-100 to release viral RNA. The specific association of antibody and virus, release of viral RNA, and synthesis and amplification of viral cDNA were carried out sequentially in a single reaction vessel. The product of this reaction, which could be clearly visualized in 1.5 percent agarose gel electrophoresis, was a 539 bp band. This approach simplified sample preparation and enhanced the specificity of conventional PCR. The method could be used for detection of dengue viral RNA from 2-2.5 TCID<sub>50</sub> virus.

#### Cloning and Expression of the Cholera Toxin B Subunit Gene

40091005 Beijing ZHONGGUO YIXUE KEXUEYUAN XUEBAO [ACTA ACADEMIAE MEDICINAE SINICAE] in Chinese Vol 13 No 5, Oct 91 pp 332-337

[English abstract of article by Tian Jide [3944 1323 1795], Xu Zhaowei [1776 0340 3555], et al, (Institute of Epidemiology and Microbiology, Chinese Academy of Preventive Medicine, Beijing)]

[Text] The CT-B gene-expressing plasmid pXB1 and modified pXB2 were constructed using recombinant DNA techniques. These resulted in high CT-B gene expression in *E. coli* (280 to about 350 ng/ml), with CT-B accounting for 71.5% of total extracellular protein. The results of CT-B expression kinetics showed that the CT-B product levels reached a peak after 24 h in culture. Certain concentrations (100 µg/ml) of MgCl<sub>2</sub>, L-histidine and asparagine can increase the CT-B product level by 10% to about 25%. The binding of the expressed CT-B product to GM1 receptor on free or live cell membranes was identified by GM1-ELISA, CHO cytotoxicity test, indirect immunofluorescence, and the rabbit ileal loop test. No toxic response to cells or rabbits was detected.

Key words: cholera toxin B subunit (CT-B), gene clone, gene expression, Chinese hamster ovary (CHO).

#### Construction of Human Interleukin 4 High Level Expression Clone With Polymerase Chain Reaction

40091004G Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 5, Oct 91 pp 327-330

[English abstract of article by Li Chen [2621 2525], Tian Jide [3944 1323 1795], et al. of the Department of

Immunology, Beijing Medical University; project supported by "863" High-Tech Fund]

[Text] To improve the expression efficiency of human interleukin 4 (hIL-4) in *E. coli*, the polymerase chain reaction (PCR) technique has been applied to construct a new expression clone referred as pBV220/hIL-4a. According to sequencing analysis, not only it removed 200 bp downstream of stop codon TGA in the 3' terminal flanking region of intact hIL-4 cDNA, but also changed stop codon into TAA which is more frequently used in prokaryotic system by means of site-directed mutation method. The M. W. of the expressed hIL-4 still was about 15 kD, and the expression level increased to 30-40 percent of total bacterial proteins as assessed by SDS-PAGE and densitometric scanning. Furthermore, assayed by TCGF activities, 5 x 10<sup>7</sup> units of hIL-4 were produced from 1 liter of bacterial culture in flask and the output increased by 25 times as compared with former clone (pBV220/hIL-4). Successful construction of hIL-4 high level expression clone made it possible to provide large quantities of this lymphokine for the commercial supply and clinical trials.

#### Study on the Elimination of Bacteria From the Cultures of Lyme Disease Spirochetes (*Borrelia burgdorferi*)

40091004H Beijing ZHONGHUA LIUXINGBINGXUE ZAZHI [CHINESE JOURNAL OF EPIDEMIOLOGY] in Chinese Vol 12 No 5, Oct 91 pp 299-301

[English abstract of article by Wan Kanglin [8001 1660 2651], Zhang Jinsheng [1728 6855 5116], et al. of the Institute of Epidemiology and Microbiology, Chinese Academy of Preventive Medicine]

[Text] Contaminated cultures of strains H<sub>11</sub>, H<sub>20</sub> from ticks, and strain R<sub>9</sub> from patient were purified by antisera for bacteria, chemicals, filtration dilution and animal inoculation. Most of bacteria were eliminated after adding antisera into contaminated strains H<sub>11</sub>, H<sub>20</sub>. The preliminarily decontaminated cultures of strains H<sub>11</sub>, H<sub>20</sub> or those with a few bacteria such as strain R<sub>9</sub> could be completely purified by filtration, chemicals, dilution, or animal inoculation, but filtration is the simplest and the most effective purification method.

#### Production and Characterization of Three McAbs to Mycobacterium Tuberculosis

40091006B Beijing ZHONGHUA JIEHE HE HUXI ZAZHI [CHINESE JOURNAL OF TUBERCULOSIS AND RESPIRATORY DISEASES] in Chinese Vol 14 No 4, Aug 91 pp 197-198, 253

[English abstract of article by Li Qing [2621 0518] and Du Benye [6757 2609 2814] of the Beijing Tuberculosis and Thoracic Tumor Institute, 100149]

[Text] Three monoclonal antibodies to mycobacterium tuberculosis were produced and designated Ra1, Ra2

and Ra3. The spleen cells of BALB/C mice were immunized with intact, ultrasonicated M. H37Ra and H37Ra culture filtrate and were fused with NS-1 myeloma cells. The monoclonal antibodies were IgG2A, IgM and IgM respectively. The monoclonal antibodies were characterized by ELISA on 14 mycobacterial species. It showed that they reacted with H37Ra and some of mycobacterial species but did not with BCG. McAb Ra1 was used to prepare immunoabsorbent, and Ag-Ra1 was isolated from unheated H37Ra culture filtrate by affinity chromatography with the absorbent. Ag-Ra1 was a glycoprotein with MW. of 66 KDa and produced DTH in guinea pigs.

**Chemical Synthesis and Cloning of Human Plasmodium Falciparum Hybrid Peptide Antigen Gene**

40091006A Beijing SHENGWUHUAXUE YU SHENGWUWULI JINZHAN [PROGRESS IN BIOCHEMISTRY AND BIOPHYSICS] in Chinese Vol 18 No 4, Aug 91 pp 294-298

[English abstract of article by Zhong Xionglin [6988 7160 2651], Chen Shirong [7115 0099 2837], et al. of the Institute of Genetics, Fudan University, Shanghai and First Medical College, PLA, Guangzhong]

[Text] Human P. falciparum hybrid peptide antigen gene has been synthesized by the solid-phase phosphoramidite method with ABI381A DNA synthesizer. The gene is 216 bp in length and divided into 10 fragments to synthesis. All synthetic fragments were annealed and ligated with T4 DNA ligase. The product of synthetic gene was recombined with phage M13 mp18 vector and transfected to E. coli JM109. The recombinants were screened by spot hybridization with <sup>32</sup>P-label synthetic fragment. The sequence of synthetic gene was analysed by dideoxynucleotide chain termination method. The results showed that synthesized human P. falciparum hybrid antigen gene was identical with the designed one.

**Study on DNA Homologic Hybridization Between Prototype Strain and Chinese Strains of Spotted Fever Group Rickettsiae**

40091004A Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 5, Oct 91 pp 302-305

[English abstract of article by Fan Mingyuan [5400 2494 6678], Gao Qingshen [7559 1987 3947], et al. of the

Institute of Epidemiology and Microbiology, Chinese Academy of Preventive Medicine, Beijing]

[Text] DNA homology was determined between six rickettsia strains isolated by our laboratory (An-84, Se-85, W-88 from the SFG patients, FT-84, MT-84 from Dermacentor nuttalli, TO-85 from ova of D. nuttalli), one Chinese reference strain JH-74 and the prototype strain 232 of Rickettsia sibirica. The results showed that DNA of R. sibirica hybridized with DNAs from different species in the same biogroup at a level of 68.5-71.5 percent. DNAs of various strains within the species hybridized at a level of 90.95-99.0 percent. All the rickettsia strains isolated in China related at a high level to R. sibirica, and was demonstrated genetically to belong to R. sibirica species.

**Adaption of EHF Viruses in Suckling Mice and Virulence of the Viruses**

40091004D Beijing ZHONGHUA WEISHENGWUXUE HE MIANYIXUE ZAZHI [CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY] in Chinese Vol 11 No 5, Oct 91 pp 315-318

[English abstract of article by Wang Zhaoxiao [3769 2507 1321], Fu Deqing [0102 1795 1987], et al. of the Sanitary and Anti-Epidemic Station of Guizhou Province]

[Text] Thirty-three strains of Epidemic Haemorrhagic Fever (EHF) virus were isolated from either patients or rodents in Guizhou Province by using Vero-E-6 cell culture. Twenty-seven of 28 strains were adapted by passaging in suckling mice, which appeared ill and dead regularly at different passage levels. One strain of EHF virus did not cause disease till 22nd passage, which might be used for study on live vaccine. In these infected mice, the viruses were found much more in lung and brain. The EHF antigen could be detected within 4-50 days after infection, and the IgG antibody also could be found after 12 days. The infection rates were different either for the same virus strain with different inoculating routes (ic.; sc. or io.) or for different virus strains with the same inoculating route (orally). It shows that infection rates (high or low) have relations with viral virulence and inoculating route.

## **Jiangnan II-010 100MIPS-Class Minisupercomputer Developed**

### **Main Details Described**

92P60075A Beijing JISUANJI SHIJIE [CHINA  
COMPUTERWORLD] in Chinese No 44, 13 Nov 91  
p 1

[Article by Han Yun [7281 0061]: "Jiangnan Computing Institute Announces Jiangnan II-010 100MIPS Minisupercomputer"]

[Summary] At the "Computer and Communications" Exposition held at the beginning of November in Beijing, the Jiangnan Computing Institute in Wuxi formally announced availability of its independently designed minisupercomputer, which has the processing power of a supercomputer in a minicomputer-sized frame and a price only one-third to one-half that of a comparable foreign-made machine. This is the first such minisupercomputer to be domestically designed and marketed.

The new computer, which has a multiprocessor structure, consists of a host, 10 high-speed processing elements (PEs), two front-end processors, a shared main memory, and a peripheral subsystem. The data for storage is output via a high-speed bus and an SCSI [small computer system interface].

The PEs are Intel 80486 microprocessors, with 4 Mbytes of local memory. The front-end processors use both 80386 and 80486 chips. Computer network interfaces are provided, and the system can support up to eight terminals simultaneously.

Software includes the independently designed GNIX/486 2.0 multitasking, multiuser, multiprocessor, multiple-virtual-memory parallel operating system (compatible with UNIX System V); program design language and its compiler; debugging tools; a utility package; and diagnostics routines.

Master clock speed is 25 MHz, basic clock cycle is 40 ns, peak fixed-point operating speed is 187 MIPS, and peak floating-point speed is 27.5 MFLOPS. System main memory [i.e., on-board RAM] is 16-256 Mbytes, and the transmission rate of the high-speed system bus is 170 Mbytes/s.

The Jiangnan II minisupercomputer is to be serialized. After the II-010 model, the II-004 and II-020 will be introduced.

### **Additional Details Provided**

92P60075B Beijing ZHONGGUO DIANZI BAO  
[CHINA ELECTRONICS NEWS] in Chinese 8 Nov 91  
p 1

[Article by Liu Keli [0491 0344 7787] and Li Jiawei [2621 0163 5588]: "Minisupercomputer Domestically Made in Wuxi Arouses Great Interest From Many Parties"]

[Summary] The 187 MIPS Jiangnan II-010 minisupercomputer independently designed by the Jiangnan Computer Technology Institute has a price only one-half that of comparable foreign-made computers. It was formally unveiled at the '91 International Computing and Communications Conference and Exhibition, which opened on 30 October in Beijing. This minisupercomputer uses 11 80486 chips and three 80386 chips in its parallel CPU.

## **Convex Announces World's First GaAs Supercomputer at Beijing Press Conference**

92P60076B Beijing JISUANJI SHIJIE [CHINA  
COMPUTERWORLD] in Chinese No 43, 6 Nov 91 p 2

[Article by Zhan Wendao [6124 2429 1497]: "Convex Co. Formally Announces in Beijing World's First Gallium Arsenide Supercomputer"]

[Summary] At a new-product press conference held in Beijing on 14 October, the U.S. firm Convex Computer Co. formally announced the world's first GaAs-based supercomputer, which will come out in several models designated as the C3 series. According to the newly standardized CTP [composite theoretical performance] list for U.S. computer exports which took effect on 1 September this year, this computer can be exported to China.

The C3 supercomputers, each of which has 30 different GaAs gate-array designs, have processor hardware logic using 15K and 30K GaAs gate arrays and a specially developed VLSI 50K gate-array design.

The high-end model within the C3 series is the C3880, which has a clock speed of 60 MHz, a cycle time [i.e., instruction cycle] of 16.67 ns, and an eight-CPU operating speed of 1920 MFLOPS (32-bit) and 960 MFLOPS (64-bit). Maximum main memory is 4 GB [gigabytes], and main-memory transmission rate is 4 GB/s. The series now consists of three sub-series, the C3200 line, the C3400 line, and the C3800 line; in the entire series, the low-end model (least expensive and easiest to use) is the C3201, which has a floating-point processing speed of 35 MFLOPS.

The C3, which is the first RISC-based supercomputer, is a vectorized, parallel multiprocessor computer using Convex's proprietary air-cooling technology. The C3-series operating system, called Convex OS, is a UNIX system conforming to the POSIX 1003.1 standard. The system's vectorized and parallelized compiler uses the C, FORTRAN, and Ada languages. Network functions include Ethernet, UltraNet, TCP/IP [transmission control protocol/internet protocol], DECnet, NFS, and NCS.

**Harbin Institute Develops New Virus Detection/Elimination Software**

92P60050B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 36, 18 Sep 91 p 7

[Article by Wang Zhiqiang [3769 5268 1730]: "A Functionally Powerful Computer Virus Detection/Elimination Software Package Unveiled in Harbin"]

[Summary] The "SCANBOOT high-level computer virus detection/elimination software" product series developed by Harbin Institute of Electrical Engineering's Computer Engineering Department in cooperation with the Heilongjiang Province Public Security Department and the Shenzhen Municipal Sensor Technology Development Co.'s Computer Applications Research Institute can detect 134 different domestic and foreign computer viruses and their mutations, and is very strong in eliminating boot-sector-type viruses. Both interactive and batch-processing modes can be used, and instructions can be carried out over LANs. The SCANBOOT software uses a hybrid program written in Turbo Pascal 5.0 and assembly language, and is completely independently designed and written. The newest release, version 2.0, runs on IBM, Great Wall, Lang Chao, and other microcomputers.

**State S&T Commission in Software Joint Venture With Unisys Japan**

92P60064A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 16 Oct 91 p 1

[Article by Han Yuqi [7281 3768 3825]: "Ke You Software Development Co. Formed: Joint Venture Between State S&T Commission and Unisys Japan"]

[Summary] Beijing, 15 Oct (KEJI RIBAO staff)—In order to promote development of the domestic export-oriented software industry, the State Science and Technology Commission and Unisys Japan today in Beijing formed a joint venture, called Ke You [4430 0327] Software Development Ltd. The new entity, funded with a gross investment of ¥190 million, will engage in various software development projects assigned by Unisys Japan. The new software products, to be designed and developed here in China, will be sold in Japan. Initial production is scheduled for May 1992, and a target of ¥600 million in sales has been set for 1995.

**Additional Details on State S&T Commission-Unisys Japan Software Joint Venture**

92P60076A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 43, 6 Nov 91 p 1

[Article by Liu Jiuru [0491 0046 1172]: "State S&T Commission, Unisys Japan Form Joint Venture To Develop Software"]

[Summary] Ke You Software Development Ltd., a State S&T Commission/Unisys Japan software joint venture formally established on 15 October in Beijing, has a gross investment of ¥190 million, 30 percent from the Chinese side and 70 percent from the Japanese side. Term of the contract is 10 years. The new firm, which will engage in various software development projects assigned by Unisys Japan, now has 60 employees, but is projected to have 180 by 1995, when its annual revenue should reach ¥600 million. Equipment owned by the new joint venture includes one Unisys 2200/110 mainframe system, one U6000/51 minicomputer system, and 12 terminals.

**Sino-Japanese Software Joint Venture (Beijing Fujitsu Systems Engineering Ltd.) Founded**

92P60050A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 36, 18 Sep 91 p 1

[Article by Jia Hua [6328 5478]: "Another New Sino-Japanese Software Joint Venture: Beijing Fujitsu Systems Engineering Ltd. Founded in Beijing"]

[Summary] Beijing Fujitsu Systems Engineering Ltd., a joint venture among the China Computer Software and Technical Services Corp., the China International Software Engineering Co., and Japan's Fujitsu Ltd., was formally established by contract a few days ago in Beijing. Each of the three parties will bring its own expertise to play in the joint venture, which will specialize in civilian software product development, sales, applications, and post-sales service. The products will gradually be put on the international market.

**Donghai 486SX Supermicrocomputer Unveiled in Shanghai**

92P60076C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 44, 13 Nov 91 p 1

[Article by Li Qingci [2621 3237 1964]: "Donghai 486 Microcomputers Designed, Manufactured, Marketed—All in 1991"]

[Summary] In October in Shanghai, the Changjiang Computer Group formally announced availability of its two newly developed 486-class all-32-bit supermicrocomputers: the Donghai 486SX/20C and the Donghai 486A/C33-2. These new VLSI-based microcomputers have 80486SX and 80486/33 CPUs, respectively; master clock speeds are 20 MHz and 33 MHz, respectively; and peak operating speed is 15 MIPS. They come with 1 MB cache memory, interleaved-access technology and image RAM technology, 1024 x 768 high-resolution monitor, and SVGA adapter card. It is understood that by the end of the year these supermicrocomputers will be mass-produced and exported to Europe, South America, and Southeast Asia.

### **Qinghua University's Software Favorably Received on International Market**

92P60050C Beijing RENMIN RIBAO in Chinese  
26 Oct 91 p 3

[Article by Li Hongwei [2621 1347 0251]: "Qinghua University's Software Enters World Market to Favorable Acclaim"]

[Summary] Beijing, 23 October (RENMIN RIBAO report)—From the conference convened today to celebrate the tenth anniversary of cooperation between Qinghua University and Fujitsu Ltd., it has been learned that software researched and developed by Qinghua University scientists has entered the world market to favorable acclaim. In this 10-year period, 22 cooperative contract projects have been carried out. Qinghua University entities—including its Software Development Center, Computer Science and Technology Department, Applied Mathematics Department, Automation Department, and Computing Center—have been involved (178 person-times) in trade volume of 389 million yen in the 20 cooperative projects now completed. Of these, third-phase research on the KARMARKAR algorithm is at the international state-of-the-art.

### **First Domestically Developed MRP-II System Unveiled**

92P60076D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 44, 13 Nov 91  
p 5

[Unattributed article: "Shanghai Completes Hierarchical Implementation and Evaluation Reference Standards for Nation's First MRP-II System"]

[Summary] In order to popularize applications of MRP [manufacturing resources planning] technology among domestic industries, the Shanghai Municipal Office for Promotion and Application of Electronic Information Systems has overseen development of the nation's first indigenous MRP-II system, which is jointly being perfected by the Shanghai Municipal Production and Warehousing Management Research Committee and the Shanghai Sewing Machine Plant No. 1. These units recently completed development on a set of hierarchical implementation and evaluation reference standards for the system, and a prototype system has been put into place at the Shanghai Sewing Machine Plant No. 1.

### **Ada Cross-Compiler System Certified**

92P60064B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 40, 16 Oct 91 p 1

[Article by Hai Yun [3189 0061]: "Independently Developed Integrated Ada Cross-Compiler System"]

[Summary] The "ECI Ada Cross-Compiler System" independently developed by MMEI's East China Institute (ECI) of Computing Technology passed the technical appraisal jointly held in Beijing a few days ago by MMEI, NDSTIC, and the CHINATRON Corp. Ada, a high-level program design language popularized in the 1980's, has spread rapidly, with almost 300 stringently tested Ada compilers having made their debut worldwide. The ECI-developed system is an international-standard Ada compiler that uses a VAX/VMS host and an Intel-IRMX computer as the target machine.

### **New Donghai XENIX Operating System Described**

92P60086B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 45, 20 Nov 91  
p 15

[Article by Zhu Yi [2612 6146]: "Donghai XENIX V2.3.2/CVGA Chinese-Character Multiuser Operating System"]

[Summary] The "Donghai XENIX V2.3.2/CVGA Chinese-Character Multiuser Operating System" developed and manufactured by the Shanghai Electronic Computer Plant, an affiliate of the Changjiang Computer Group, passed formal technical appraisal in Shanghai at the end of September. This system, which uses the CVGA Chinese card and a color monitor, is fully compatible with the English-language XENIX V2.3.2 operating system. Character input can be in any of four modes including Pinyin. The master console can simultaneously control screen displays on a maximum of 12 terminals. Each screen can display a maximum of 25 lines of 40 characters each at one time. This new operating system, whose high-level languages include C and VS COBOL, can support several types of printers, including M1724 and M1570.

### **MCM4200 Superminicomputer Hits Market Within 6 Months**

92P60086A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 45, 20 Nov 91  
p 1

[Article by Shang Mu [1424 2606]: "MCM4200 Superminicomputer Hits Market Within 6 Months"]

[Summary] The U.S. firm DEC [Digital Equipment Corporation] formally announced its VAX4200 superminicomputer in March this year, and within 6 months of that announcement, the Shenzhen Modern Computer Plant announced availability of its VAX4200-compatible MCM4200 superminicomputer. This new superminicomputer comes with an 8, 16, 24, or 32 MByte MCM650-X half-height internal memory [i.e. on-board RAM]. Except for the CPU, the entire computer is domestically made, and comes with a price tag only 1/2 that of the VAX4200.

### Shanghai Plans To Develop a Robot Industry

40100010 Beijing CHINA DAILY (SHANGHAI FOCUS) in English 9 Dec 91 p 1

[Text] Shanghai has worked out a plan to develop a robot industry in the next several years.

"A local report on it has been delivered to the State," said Gu Changgeng, deputy director of the Department of Advanced Technology under the Municipal Science and Technology Commission.

"The city has developed model robots but this, however, does not constitute an industry, even though the city has spent 4 million yuan (\$754,000) on research. As a result, they have been unable to play the role they deserved in local industrial production," said Gu.

According to the deputy director, the city will make a study on overseas robot development and compare the results to the city's status quo before laying down a specific plan.

Top priority will be given to the improvement of robot production technique and tools rather than design, he said.

But the problem facing the local government is how to make universities and manufacturers join hands in turning out robots, Gu said.

"This is a tricky problem, for some universities want to manufacture robots by themselves, even though their production means are no better than the factories'," said the deputy director, adding that efforts would be taken to improve relations.

If things progress smoothly, the city will be able to form a robot industry in two or three years because of its strong technical base, he said.

According to Gu, the city's first bridge robot has been developed, the result of cooperation between a university and an enterprise. Another two are being built.

High-performance robots are on the drawing board, he said. The city is set to develop special robots used for climbing walls and mountains, cleaning the glasses of high-rises as well as micro machines that involve micro-electronics, computers, lasers and robots.

Gu hopes to cooperate with overseas investors on digitally controlled technology in a bid to step up the city's robot industry.

"Without quick growth of the advanced technology, the city will be unable to develop its flexible manufacturing system (FMS), which is considered a necessary part of modernized industrial production," said the deputy director.

### SN6885 Machine-Tool Numerical Control System Certified

92P60051A Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 27 Sep 91 p 3

[Article by Shu Guang [2562 0342]: "SN6885 Machine-Tool Numerical Control System Passes Appraisal"]

[Summary] The SN6885 economical NC machine-tool computer control system developed by the Beijing No. 3 Heavy Electrical Equipment Plant passed production design finalization on 14 September. This high-performance-to-cost-ratio product has an 8031 micro-processor, takes data input via ISO standard NC code, and permits joint drive of any two of the three (X, Y, and Z) axes. Single-edge-lathe cutting quantity can be as small as 6 mm, and machining accuracy is 0.01 mm. The system stepper motor's maximum static moment is 16 Nm [Newton-meters], and maximum feed speed is 6,000 mm/min. This new NC machine tool CNC system, available for an investment of under 10,000 yuan, is oriented to domestically made economical NC machine tools that are part of the state's Eighth 5-Year Plan priorities.

**Domestic LIS Technique Produces 2 mg/hr of 3-Percent-Enriched Uranium***92P60065E Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 4 Nov 91 p 2*

[Article by Li Tao [2621 2711] and Xie Yanhua [6200 5333 5478]: "Experiment in Collecting Macroscopic Quantities of Uranium Isotope via Laser Separation Succeeds"]

[Summary] Scientists from the Ministry of Nuclear Industry's [i.e. China National Nuclear Corporation's] Institute of Physical and Chemical Engineering (IPCE) and from the CAS Shanghai Institute of Optics and Fine Mechanics (SIOFM) have successfully carried out an experiment in collection of macroscopic quantities of U-235 via laser isotope separation (LIS). The scientists achieved a collection rate of over 2 mg/hr of uranium with a 3-percent U-235 enrichment. The experiment proves the feasibility of moving from research on the principles of uranium LIS to the engineering stage. Since 1989, IPCE has conducted experiments on two-step and three-step enrichment of enriched, natural, and depleted uranium; using a domestically made laser system and separator system IPCE has produced uranium with a U-235 enrichment of over 95 percent as indicated by mass spectrometer signals, and have achieved a maximum enrichment factor of over 2,000.

**Additional Details on Domestic LIS Technique for Enriching Uranium***92P60077F Beijing ZHONGGUO KEXUE BAO [CHINESE SCIENCE NEWS] in Chinese 15 Nov 91 p 1*

[Article by Zhu Xuhui [6175 2485 6540]: "Experiment To Collect Macroscopic Quantity of Enriched Uranium Succeeds"]

[Summary] Beijing (ZHONGGUO KEXUE BAO report)—Scientists from the China National Nuclear Corporation's Institute of Physical and Chemical Engineering (IPCE) recently carried out a successful experiment at the CAS Shanghai Institute of Optics and Fine Mechanics (SIOFM): they used a domestically developed copper-vapor laser isotope separation (LIS) technique to produce uranium with a U235 enrichment of over 3 percent; the collection rate was over 2 mg/hr, and the one-time collected amount exceeded 5 mg. The experiment employed a copper-vapor-laser oscillation and amplification system developed in a five-year effort by SIOFM scientists and a separator system developed by IPCE scientists. The experiment indicates that Chinese LIS research and development can take its place in the world's front ranks.

**Development of Over-the-Horizon Sensor Technology***92P60060A Beijing ZHONGGUO HANGTIAN [AEROSPACE CHINA] in Chinese No 8, Aug 91 pp 39-42*

[Article by Zhang Zhe [1728 0772] and Wang Jinrong [3769 6855 2837]: "Development of Over-the-Horizon Detection Technology"]

[Text] In connection with the development of domestic coastal defense missiles, Chinese scientists began research on high-frequency (HF) ground-wave over-the-horizon (OTH) detection in November 1967, when a group led by the now-distinguished scientist Qian Xuesen took up the challenge of developing an OTH radar able to detect targets at 250 km. In the early 1970's, Chinese researchers conducted experiments with pulsed radar OTH detection based on ground-wave scattering principles; they used a beam angle of 1°, a wavelength of 40 m, and an antenna length of 2,300 m. This research was limited, however, by the unavailability—due to export restrictions by foreign governments—of appropriate technology.

In the early 1980's, with domestic advances in computers, semiconductor technology, and digital signal processing (DSP) techniques, Harbin Institute of Technology (HIT) over a three-year period successively perfected 11 key techniques fundamental to further development of ground-wave OTH radar. Having selected a 2-10 MHz operating frequency range, researchers applied the HIT advances and carried out experiments with clutter frequency shift (the Bragg lines) to better separate clutter and target, distinction between target Doppler shift and Bragg echo Doppler frequency, precise spectral determination of sea-wave clutter and target echo, constant false-alarm rate (CFAR) automatic detection, true-false target decision, parametric estimation, and improved filtering techniques for very-low-error multi-target track display. Particular mathematical techniques included two-dimensional fast Fourier transforms (FFT) and dynamic real-time processing of large amounts of data. Figure 3 is a schematic of the ground-wave OTH radar principle. [Figures 1 and 2, showing the basic geometry of ground-wave OTH radar, are not reproduced.]

The experimental system employs a continuous-wave linear-frequency-modulated (LFM) receive/transmit shared-site system (FMICW), digital-channel and analog-channel compensation techniques, high-resolution signal processing technology, and clever target-tracking techniques. Its technical indicators for detection and tracking meet or exceed the international state-of-the-art.

Preparations are currently underway for a new series of experimental studies, including detection of warship signatures in the 2-10 MHz band, detection of low-altitude aircraft and low-flying cruise missiles, use of digital beam-forming technology (DBF) to replace the

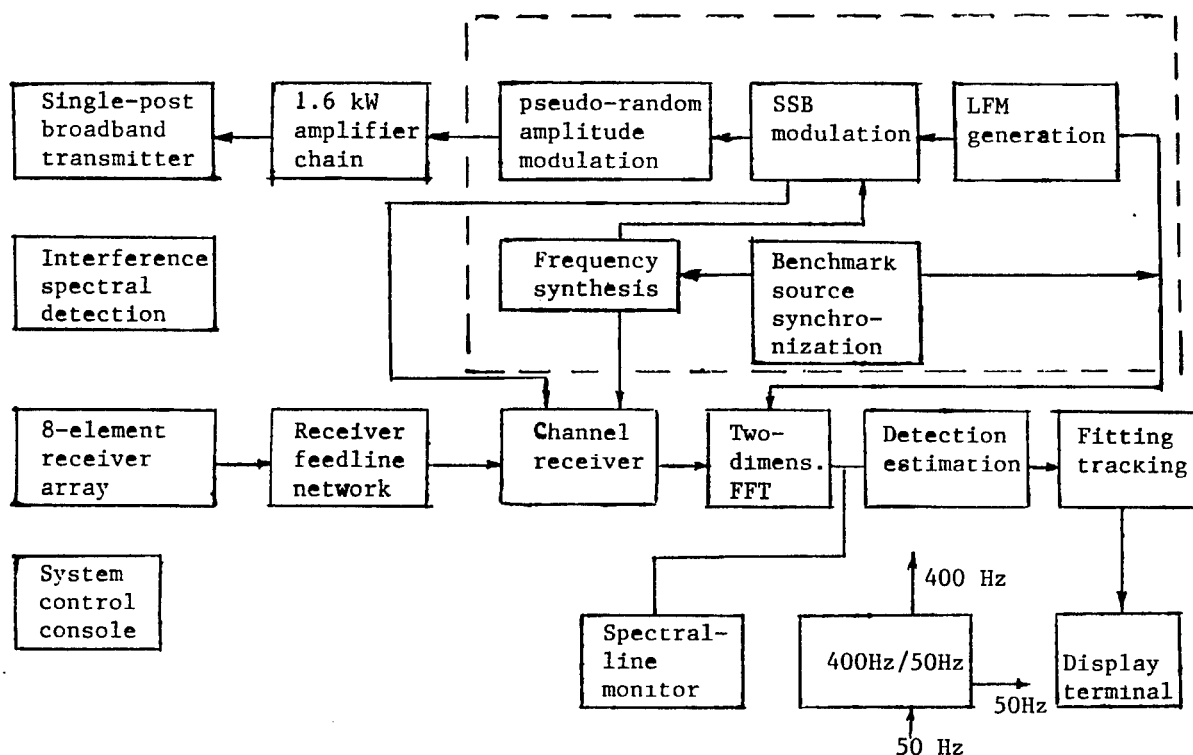


Figure 3. Schematic of Ground-Wave OTH Radar Principle

old analog beam forming, research on broadband transmitters, sea-state remote sensing research and related basic research, near-field testing of HF antenna directional plots, recognition of HF target characteristics, and research on improved IFF techniques.

Additional HF OTH radar topics needing addressing include electromagnetic compatibility, suppression of enemy jamming, adaptive polarization cancellation, adaptive DBF technology, and improvement of mobile-unit autonomy—reports have come out on foreign development of vehicle-borne ground-wave radars, and China should tackle this problem.

China has also been active in the area of sky-wave OTH radar. In the 1980's, the first domestically developed experimental HF [sky-wave] OTH radar was completed. This single-trip backscatter radar uses a linear-FM pulse-compression system; at 100 kW average power, it can detect civilian aircraft at a range of over 1,000 km.

#### Sagnac-Interferometer-Based Fiber Optic Gyro Passes National Appraisal

92P60077C Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 10 Nov 91 p 2

[Article by Ke Wen [2688 2429]: "New Elegant Navigational [Device]: the Fiber Optic Gyro"]

[Summary] In a four-year research project, scientists at Shanghai University of Science and Technology's Fiber Optic Institute have developed a fiber optic gyro—a high-tech device export-controlled abroad—based on the Sagnac interferometer principle and fiber optic waveguide principles. This first domestically developed fiber optic gyro, which has now passed national-level technical appraisal, consists of a directional fiber coupler, a fiber optic phase modulator, a fiber optic polarimeter, and other components, and is completely domestically made.

#### ZTY-1A Piezoelectric Modular Gyro Certified

92P60077B Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 8 Nov 91 p 3

[Article by Lai Daoqin [6351 6670 2953]: "ZTY-1A Piezoelectric Modular Gyro"]

[Summary] The model ZTY-1A piezoelectric modular gyro, developed by MMEI's Institute 26, recently passed formal appraisal. This gyro outputs three attitude control signals: angular rate, angular acceleration, and change of angular rate. With features such as short set-up

time, low error from electrical null position, high sensitivity, low drift, and high resistance to vibrational interference, this gyro is suitable for use in control systems with all-electric-drive stabilization.

#### **8mm Multi-E-Beam Cerenkov FEL Oscillator Certified**

92P60081 Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 19 No 6, Nov 91 p 127

[Unattributed article: "8mm Multiple-Electron-Beam Cerenkov Free Electron Laser Oscillator Passes Technical Appraisal"]

[Summary] The multiple-electron-beam (multi-E-beam) Cerenkov free electron laser (FEL) oscillator developed by a joint research group from the University of Electronic Science & Technology (UEST) and from the China Academy of Engineering Physics (CAEP) has produced almost 1MW of stimulated Cerenkov radiation at a wavelength of 8 millimeters (mm). This multi-E-beam Cerenkov FEL oscillator, which passed rigorous tests conducted by a national group of experts convened at UEST on 21 September 1991, was unanimously appraised as scientifically innovative and at an international state-of-the-art level. The principal technical performance indicators for the new device are as follows: E-beam voltage = 500 kV, E-beam current = 355 A, operating mode is  $TM_{015}$ , operating frequency = 33.4 GHz, output power exceeds 0.92 MW, and interaction efficiency exceeds 0.5 percent. The joint research group, led by CAS Academic Committee Member Prof. Liu Shenggang [0491 4141 4854], employed a newly developed multiple-dielectric-sheet structure to build the slow-wave system. The entire project, which began in 1989 and was funded by a domestic research grant, is described in a formal technical paper published in APPLIED PHYSICS LETTERS.

#### **High-Brightness Electrostatic Focusing Head-Up Display Unveiled**

92P60077A Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 8 Nov 91 p 1

[Article by Ge Ping [2047 1627]: "High-Brightness Electrostatic Focusing Head-Up Display Unveiled"]

[Summary] A new-generation high-brightness CRT—the 8SG91Y1 electrostatic focusing head-up display—recently passed design finalization. This new display, independently designed and developed a year ahead of schedule by the Wuhu Municipal Electro-Vacuum Research Institute, is intended for a head-up display weapons fire-control system. It takes data from a variety of sources—an atmospheric data computer, an inertial navigation system, a radar, a fire-control computer, and other airborne equipment inputs and fuses them organically onto a high-brightness, high-resolution character/

graphics display. The new display incorporates a large-aperture high-bipotential-lens main focusing system, high-efficiency fluorescent-screen manufacturing technology, and a high-strength tube design, meeting late-eighties international standards.

#### **Real-Time Digital IR Focal-Plane Staring Thermal Imager Developed**

92P60065A Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 41, 23 Oct 91 p 5

[Article by Yue Ziqiang [2867 1311 1730]: "Real-Time Digital-Processing Infrared Focal-Plane Staring Thermal Imager"]

[Summary] The IR-64N infrared focal-plane staring thermal imager developed by the CAS Shanghai Institute of Technical Physics (SITP) recently passed expert evaluation in Shanghai. This new device, which has a real-time display and digital processing, is based on a platinum-silicide Schottky-barrier IR CCD planar array and an 8051 microprocessor. After amplification, filtering, and other pre-processing, the analog IR-radiation input signal is A/D converted into an 8-bit digital signal. The system has false-color, B&W, and other display modes, as well as temperature gauges and a character display. Circuitry includes two (one 128 x 128-pixel and one 32 x 64-pixel) IR focal-plane CCDs. Thermometric range is room temperature up to 120°C, noise equivalent temperature is 1°C, FOV is 7.3° x 7.3° or 3.65° x 3.65°, instantaneous FOV is 4 x 2 mrad or 2 x 1 mrad, optical aperture is 25 mm or 50 mm, F number is 1.6, and optical wavelength range is 3-5  $\mu$ m. This highly reliable, low-cost unit has applications in military night vision, temperature monitoring, thermal fault analysis, non-destructive testing, and related areas.

#### **Mount Pinatubo Ash Clouds Detected by Independently Developed Laser Radar**

92P60065C Beijing ZHONGGUO KEXUE BAO [CHINESE SCIENCE NEWS] in Chinese 29 Oct 91 p 1

[Article by Hu Huanling [5170 2970 7177]: "Mount Pinatubo Clouds Drift Into Chinese Airspace; Closely Monitored Day and Night by Anhui Optics Institute's Large Radar"]

[Summary] Scientists at the CAS Anhui Institute of Optics and Fine Mechanics (AIOFM), using their independently developed L625 large laser radar (LIDAR), have for the first time detected 21-km-altitude ash clouds originating from Mt. Pinatubo in the Philippines. These scientists determined that the ash-cloud particle density compared to normal particle density at that altitude is over 10 times higher. The AIOFM researchers, using their L625 LIDAR over a three-week period, noticed that the cloud thickness increased from 1.2 km at the beginning of the period to over 4 km, and that a

layered structure was gradually forming; they are continuing to closely monitor the situation.

### **Sino-Australian Airborne Imaging Spectrometer on International Market**

92P60077E Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 13 Nov 91 p 1

[Article by Tang Dongning [3282 2639 1337]: "China's Airborne Remote Sensing Technology Enters International Market for First Time"]

[Summary] The Chinese Academy of Science's (CAS) high-altitude remote sensing aircraft, bearing a newly developed 71-channel aerial imaging spectrometer, was recently employed in a successful experiment jointly conducted by CAS scientists and colleagues in Australia. A letter of intent to form a Sino-Australian joint venture remote sensing company was recently signed by both parties, indicating the first commercialization of domestically developed remote sensing technology as well as its first entry onto the international market. China is the third nation—after the United States and Australia—to have developed imaging spectrometer technology, which can be used for a variety of earth-observation tasks. CAS Remote Sensing Institute scientists carried out the initial contact and exploratory talks in Australia in July of last year, and in late September to early October this year, the CAS high-altitude remote sensing aircraft was used to test the new system in flights over almost 3,000 square kilometers of the Northern Territory and Western Australia. Australia's International Technology Authority has given the new system a very high appraisal.

### **Airborne Multi-Spectral Image Monitoring System Unveiled**

92P60065B Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 25 Oct 91 p 3

[Article by Yue Ziqiang [2867 1311 1730]: "New Breakthrough in Nation's Airborne Remote Sensing Technology Application"]

[Summary] A multi-functional, multi-band display system developed by the [CAS] Shanghai Institute of Technical Physics (SITP) has for the first time been successfully used as a real-time remote sensing imagery monitoring system to accompany a domestic airborne multi-spectral scanner (MSS). The operational stability and reliability of this new system, which can simultaneously monitor over 10 bands, have been proven through over a year of trials. System functions include a mobile windows-type display of multi-band remote sensing imagery, video color look-up, hardware histogram statistics, full-screen color character/graphics overlay, aircraft navigational data input, and a computer control interface. Imagery information is recorded on digital computer-compatible tape (CCT). Trials of the

new system have included real-time forest-fire monitoring and offshore-oil pollution detection.

### **Domestically Developed Laser Rangefinder Passes Design Finalization**

92P60077D Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 10 Nov 91 p 3

[Article by Sun Yushan [1327 3768 1472] et al.: "Marine-Use Laser Rangefinder Passes Design Finalization"]

[Summary] The CJH88-200 marine laser rangefinder developed by State-Run Plant 238 recently passed production design finalization. This new device has an operating range of 30 km, an accuracy of  $\pm 50$  m, fast target acquisition, a digital display, and comes with an RS232 standard digital output interface; it can be used by coastal defense units as well as by naval personnel and the merchant marine, and meets 1980's international standards for comparable products.

### **All-Solid-State Monopulse Navigational Secondary Radar Unveiled**

92P60052B Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 2 Oct 91 p 1

[Article by Jing Deji [4842 1795 1015]: "All-Solid-State Monopulse Navigational Secondary Radar Unveiled"]

[Summary] The all-solid-state monopulse navigational secondary radar developed by MMEI's Institute 14 with its own funds passed appraisal on 12 September in Nanjing. This radar, which incorporates an LVA (large-vertical-aperture) antenna [see description in JPRS-CST-91-018, 12 Sep 90 p 27], has an all-solid-state transmitter, a low-noise receiver, a monopulse goniometer, improved sidelobe-suppression circuits, distributed multiprocessor target processing, and other advanced features. Maximum target observation range is 260 km, bearing accuracy is 0.05 degree, range accuracy is 28 m, and the maximum number of densely packed aircraft targets processable simultaneously is 224. Testing shows that the new radar, which complies with ICAO (International Civil Aviation Organization) specifications, has a performance that matches the international state-of-the-art.

### **Autonomous Radar Raster Scanning Color Display Unveiled**

92P60052A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 25 Sep 91 p 1

[Article by Wang Mengling [3769 1322 7117]: "Autonomous Radar Raster Scanning Color Display Unveiled"]

[Summary] Chengdu, 24 Sep (KEJI RIBAO wire report)—An autonomous radar raster scanning color

display developed as a State Seventh Five-Year Plan priority project by the University of Science and Technology for National Defense (USTND) passed expert appraisal today in Chengdu. Following upon its development of other high-level display systems for the Yuanwang satellite tracking ships, for the Xichang Satellite Launch Center, and for the Xian Satellite Tracking and Control Center, USTND has caught up to the world state-of-the-art with this latest system, which can simultaneously display images in any of 256 colors, can show backgrounds, microlists, target imagery, and synchronous parameters, and has various functions such as windows, enlargement, and arbitrary image shifting. The experts at the appraisal noted that this new system represents an advance from the old-generation monochrome, SSI-based, random scanning displays to the new-generation color, VLSI-based, raster scanning displays. In strap-down tests with an experimental radar, it exhibited stable and reliable performance meeting late-eighties international standards.

#### **Semiconductor-Laser-Pumped External-Cavity YAG Laser Developed**

92P60068A Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese Vol 11 No 10, Oct 91 p 905

[Article by He Huijuan [0149 1979 1227], Zhao Qingchun [6392 1987 2504], et al. of the CAS Shanghai Institute of Optics and Fine Mechanics (SIOFM), Shanghai, 201800: "First Domestic Operation of Semiconductor-Laser-Pumped External-Cavity YAG Laser"]

[Summary] On 8 July 1991, at the CAS SIOFM "Laser Technology Open Research Laboratory," the authors used a one-dimensional phase-locked diode laser array, developed at SIOFM's "Semiconductor Optoelectronics Laboratory," to pump an external cavity YAG laser with a 1.064  $\mu\text{m}$  output for the first time domestically. The domestically developed GaAlAs/GaAs double-heterostructure 10-element phase-locked semiconductor laser array has a maximum peak power of 75 mW, an excitation-current pulse width of 0.1 ms, and a repetition rate of 1 kHz. The external cavity laser, which uses a 5-mm-long YAG rod, has a threshold of 3 mW, and operates in the TEM<sub>00</sub> and TEM<sub>01</sub> modes. An output power of 2.8 mW was achieved at the 1.064  $\mu\text{m}$  wavelength. Also, the authors used a 30-mW-CW-output semiconductor laser array to pump the same external-cavity YAG laser and achieved a 4.7 mW CW output with a slope efficiency of 32.8 percent.

#### **Mode-Locked ps Semiconductor Laser Research at State-of-the-Art**

92P60065D Beijing ZHONGGUO KEXUE BAO [CHINESE SCIENCE NEWS] in Chinese 29 Oct 91 p 1

[Article by Wang Baizhan [3769 4102 2069]: "Mode-Locked Picosecond Semiconductor Laser Research at Advanced International Level"]

[Summary] Xian (ZHONGGUO KEXUE BAO wire report)—Research on a mode-locked picosecond (ps) semiconductor laser—a project undertaken by the CAS Xian Institute of Optics and Fine Mechanics (XIOFM) as part of the "863" High-Tech Development Plan—recently passed expert appraisal in Xian. The experts unanimously agreed that the research project's results are at a world-class level. Project scientists, formally beginning research in late 1987 on this 863 Plan optoelectronics topic, used grating external-cavity techniques to develop an ultrahigh-repetition-rate autonomous mode-locked semiconductor laser with a minimum generated pulse width of 9.3 ps. Measurement instruments include an independently developed low-power second-harmonic autocorrelator. Operating frequency has reached 1.3 GHz (the maximum frequency of the signal source input), and the mode-locked laser operated stably for over four hours.

#### **Micron-Level Two-Element-Optics Fabrication Technology Perfected**

92P60077G Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 27 Nov 91 p 1

[Article by Jiang Zaizhong [1203 0961 1813]: "China Masters Two-Element-Optics Fabrication Technology"]

[Summary] Beijing, 26 Nov (XINHUA)—Researchers from the CAS Microelectronics Center and other units have been able to fabricate micron-level three-dimensional graphics on quartz, glass, and other optical dielectrics, indicating that the nation's scientists have mastered "two-element-optics" fabrication technology. Since the mid-eighties, when Chinese scientists first began studying micro-fine machining processes, they have learned how to use reactive ions to bombard the optical media in order to create the micron-level devices, which are used in optical information processing, optical communications, laser machining, robot vision, and other high-tech areas.

### **Domestically Made Radiation-Hardened CMOS ICs Batch Produced**

92P60066A Beijing ZHONGGUO KEXUE BAO  
[CHINESE SCIENCE NEWS] in Chinese 25 Oct 91  
p 2

[Article by Liu Jian [0491 0494]: "Domestically Made Radiation-Hardened CMOS Integrated Circuits Reach Functional Stage"]

[Summary] Urumqi (ZHONGGUO KEXUE BAO wire report)—Scientists from the CAS Xinjiang Physics Institute and from Beijing Semiconductor Devices Plant No. 3, after a cooperative research project lasting several years, have finally put into batch production for the first time domestically several varieties of aluminum-boron radiation-hardened CMOS ICs, which are now at a utilitarian stage. Over 5,000 of these aluminum-boron/silicon ICs, in 28 varieties designated as the 4000 series, will be batch produced by the institute and plant in order to meet the strict requirements of space qualification, so that they may be used on the Dongfang Hong 3 (DFH-3) long-life, high-capacity communications satellite now being developed and scheduled to be launched by units under the Ministry of Aerospace Industry.

### **Complete 1-1.5-Micron CMOS VLSI Fabrication Technology, 1-Mbit Chinese-Character ROM Pass MMEI Appraisal**

92P60053C Beijing ZHONGGUO DIANZI BAO  
[CHINA ELECTRONICS NEWS] in Chinese 11 Oct 91  
p 1

[Article by Liu Shuen [0491 3219 1869]: "Major Breakthrough in Microelectronics Technology: Integration Level Exceeds 1 Million Elements for First Time"]

[Summary] Qinghua University Microelectronics Institute's Seventh Five-Year Plan priority project to develop a complete 1-1.5-micron CMOS VLSI fabrication process, including development of a 1-Mbit Chinese-character ROM with 1.06 million transistors, passed the MMEI-organized technical appraisal on 29 September in Beijing. Numerous dignitaries from industry and government (including MMEI and the State Education, S&T, and Planning Commissions) attended the formal ceremony and offered their congratulations. The completion of this production line is of enormous significance to the Chinese microelectronics industry, since it represents a two-generation jump forward into the VLSI arena, and also represents a smashing of the international blockade and embargo on exports of such technology to China.

### **New GaAs Monolithic OEICs Developed**

92P60053B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 38, 2 Oct 91 p 1

[Article by Xin Zi [2946 1311]: "Shanghai Institute of Metallurgy Realizes Two Achievements in High-Tech Information Area"]

[Summary] In the 1980's, developed nations such as the United States, Japan, and some Western European countries began to fabricate GaAs monolithic optoelectronic integrated circuits (OEICs) and InP-series optical transmitter and receiver monolithic ICs. Now, in a three-year research effort, the CAS Shanghai Institute of Metallurgy has completed two such research projects, assigned by the State 863 High-Tech Development Plan. Led by CAS Academic Committee member Zhang Xu [1728 3563], a team of 12 scientists has developed a GaAs monolithic optical receiver chip with an excellent response to a 1 GHz sinusoidal optical wave signal input. The device's degree of circuit-element integration and fabrication characteristics such as line width meet mid-eighties international standards. The research team has also developed a series of InP optoelectronic integrated unit devices, including an InGaAsP/InP HBT [heterojunction bipolar transistor] with a current gain that matches the worldwide state-of-the-art for such devices and an InGaAs PIN/JFET [positive-intrinsic-negative junction field effect transistor] unit integrated optical receiver chip with excellent response to a 206 MHz square-wave optical pulse signal input; degree of integration and line width again meet mid-eighties international standards.

### **Nine Varieties of Domestically Made ASICs Used in S1240 SPC Switch**

92P60066B Beijing ZHONGGUO DIANZI BAO  
[CHINA ELECTRONICS NEWS] in Chinese 30 Oct 91  
p 1

[Article by Mao Xifang [0379 6932 5364]: "New Breakthrough in Shanghai IC Industry Research and Production"]

[Summary] The Shanghai integrated circuit (IC) manufacturing industry has seen rapid growth recently, with 8.05 million ICs of all types produced in the first eight months of this year, a 10.6 percent increase over the same period last year. Especially important among batch-produced ICs are nine varieties of LSI application-specific ICs (ASICs) now incorporated into Shanghai Beiling [i.e., Bell Mountain] Microelectronics Manufacturing Ltd.'s domestically made S1240 stored program-controlled (SPC) telephone switch.

With advanced LSI ASIC manufacturing equipment imported from Belgium, Shanghai Beiling Ltd. has employed 2.4-3-micron CMOS, NMOS, and BiMOS fabrication technology to produce devices with a degree of integration ranging from 20,000 to 50,000 discrete elements, respectively. In May this year, the first product sample, a dual switcher, smoothly passed life-expectancy and batch-production verifications conducted by Belgium Bell Co. engineers as well as in-operation tests conducted by Shanghai Bell Co. technicians; these tests have certified the product to international standards so that it may be sold on the international market. This first product was put into mass production in July and the number passing inspection has exceeded the verification standard. Among the other eight ASIC products, a digital

bit-number processor and a dual processing terminal controller will hopefully pass all verifications and be put into mass production in the near future. In late August this year, a four-port IC and port controller IC made their debut; the former, the largest of the nine ASICs, has a chip area of only 8.1 x 8.5 mm, while the latter, a 132-pin circuit, is the most advanced put into industrial-scale production in China so far.

### Construction Completed on 1.5-Micron-Level IC Fabrication Line at Shenyang

92P60078A Beijing ZHONGGUO DIANZI BAO  
[CHINA ELECTRONICS NEWS] in Chinese 6 Nov 91  
p 1

[Article by Liu Jize [0491 4764 3419]: "Shenyang Completes Construction of IC Fabrication Line"]

[Summary] Renovations to the Microelectronics Processing Center in the northern part of Shenyang passed national-level acceptance check on 28 October. The new construction, undertaken by MMEI's Institute 47, includes facilities for fabrication of 1.5-micron-level VLSI circuits. Funded with a gross investment of 44.50 million yuan, the new facilities cover 11,000 square meters, of which 2,160 square meters are for the ultra-clean rooms (including 126 square meters for level-10 and level-100 clean rooms), and should permit development of almost 100 new LSI and VLSI products annually. Key Eighth Five-Year Plan projects to be assumed at the new Shenyang fabrication line include development of a 32-bit RISC-based microcomputer IC series, 10K-gate gate arrays, 256K EPROMs, and 14-bit D/A converters.

### Domestically Made Supertwist-Nematic LCD Unveiled

92P60078C Beijing ZHONGGUO DIANZI BAO  
[CHINA ELECTRONICS NEWS] in Chinese  
17 Nov 91 p 3

[Article by Chen Shumin [7115 2885 3046]: "Shuguang Electron Device Plant Develops STN-Type LCD"]

[Summary] Domestically made LCDs have heretofore employed the twisted-nematic (TN) design, which twists the light path through the crystal by an angle of 90°. Now, however, the Shuguang [2562 0342] Electron Device Plant (Plant 770) in Changsha has announced its development of a 640 x 200-pixel yellowish-blue-model supertwist-nematic (STN) LCD. The STN type of LCD twists the light path by 180-270°, and is a more advanced type. Already trial-manufactured is a [smaller] device, the 64 x 240-pixel STN LCD screen, which has dimensions of 80 mm x 175 mm x 2.2 mm; color is yellowish-blue, and the twist is 180°. Quality has reached the international state-of-the-art for comparable products.

### Plasma Flat Panel Display Put Into Production

92P60053A Shanghai DIANXIN KUAIBAO  
[TELECOMMUNICATIONS INFORMATION]  
in Chinese No 9, Sep 91 p 31

[Article by Zhang Bowen [1728 0130 2429]: "Plasma Flat-Panel Light-Emitting Screen"]

[Summary] A plasma flat-panel light-emitting screen, also called a flat panel display (FPD), has been developed by the Shanghai Sida [Star] Computer Company (a Fudan University high-tech enterprise), and put into batch production. The new FPD, which incorporates international-standard technology, has a DC operating voltage of 12V or 24V, an input signal of 0-2V, and adjustable contrast; it comes in 201-line or 101-line models.

### Flat-Panel-Display R&D Center Built

92P60078B Beijing ZHONGGUO DIANZI BAO  
[CHINA ELECTRONICS NEWS] in Chinese  
10 Nov 91 p 1

[Article by Feng Ping [7458 1627]: "National Flat-Panel-Display R&D Center Built"]

[Summary] Construction on the nation's first flat-panel-display (FPD) research and development center was formally completed on 1 November. The construction, overseen by MMEI's Nanjing Institute 55, not only represents the realization of a national-level base for R&D of FPD technology, but also contributes to the promotion of applications for electronic information systems nationwide. Personnel trained at the new center will undertake various government-assigned projects, including new-product development.

### Deposition of Diamond Thin Films by DC Arc Plasma Jet

92P60047A Beijing KEXUE TONGBAO in Chinese  
Vol 36 No 19, 1-15 Oct 91 pp 1454-1456

[Article by Bai Yizhen [4101 0076 4176], Lu Xianyi [0712 2009 5030] et al. of the Institute of Atomic and Molecular Physics, Jilin University, Changchun, 130023: "Deposition of Diamond Thin Films by DC Arc Plasma Jet Method"; MS received 3 Dec 90]

[Abstract] Via an independently designed DC arc plasma jet apparatus, polycrystalline diamond thin films with good crystallization characteristics have been deposited on hard metal, monocrystalline silicon, and other substrates. Deposition rate is about 20 µm/hr and film diameter is in a range surrounding 10 mm. With WC and Si substrates in the 800-1,200°C temperature range, three different gases were tried: 15-25 l/m of Ar, 2.0-6.5 l/m of H<sub>2</sub>, and 4-200 sccm of CH<sub>4</sub>; operating pressure was (2-5) x 10<sup>3</sup> Pa, operating voltage was 25V, and operating current was 40-120A.

Four figures show a schematic of the plasma jet apparatus, two spectroscopic analyses of the data, and an SEM photograph of a sample prepared via the techniques under study.

### Reference

1. Kazuaki Kurihara et al., APPL. PHYS. LETT., 52 (1988), 437.

**Low-Temperature-Superconductor 6000-Gauss MRI System Certified**

92P60085 Beijing GUANGMING RIBAO in Chinese  
28 Nov 91 p 1

[Article by Zhang Qubo [1728 2575 3134]: "Major Advance in Application of Low-Temperature-Superconductor Technology"]

[Summary] A 6000-Gauss low-temperature-superconductor magnetic resonance imaging (MRI) system developed by the CAS affiliate Kejian [4430 0256] Ltd. passed the technical appraisal conducted by the State Science & Technology Commission in Shenzhen's Shekou district on 20-21 November. This domestically designed and developed system, which is over 90 percent Chinese made, represents the first industrialized domestic product based on application of low-temperature-superconductor technology.

**High-Performance Niobium-Tin Superconducting Wire Developed Jointly by Shanghai, French Scientists**

92P60057B Shanghai JIEFANG RIBAO in Chinese  
2 Nov 91 p 1

[Article by Hua Kangcheng [5478 1660 2052] and Jiang Jishen [3068 3444 3947]: "High-Performance Superconducting Material Developed in Shanghai"]

[Summary] Scientists from the Shanghai Nonferrous Metals Institute (SNMI) have boldly seized the initiative in fabricating—for the first time worldwide—a high-performance, low-temperature  $\text{Nb}_3\text{Sn}$  (niobium-tin) multicore superconducting material, and have greatly

increased the practicality of this material. In the first half of this year, SNMI scientists and some French colleagues jointly developed an HTS material with a critical current density of 20,000 A [per square centimeter]. Now, the scientists have developed an  $\text{Nb}_3\text{Sn}$  wire via a new process that overcomes the fatal weak points associated with the traditional technique. According to tests carried out at the French Nuclear Research Center, this new high-performance superconducting material's main performance indicators such as critical current density are 50-100 percent higher than those for the common  $\text{Nb}_3\text{Sn}$ ; these values are at the international state-of-the-art. This wire is used in controlled thermonuclear reaction apparatuses and in high-resolution NMR [nuclear magnetic resonance] imagers.

**National HTS Conference Held in Hefei**

92P60057A Shanghai JIEFANG RIBAO in Chinese  
25 Oct 91 p 3

[Article by Fu Zhenxin [0265 2182 2946] and Xuan Fenghua [1357 1144 5478]: "Nation's High-Temperature Superconductivity Research at World's Forefront"]

[Summary] Hefei, 24 Oct (XINHUA)—It has been learned from the Third National High-Temperature Superconductivity (HTS) Conference convened today that the nation's HTS research is in the world's front ranks, and that efforts are under way toward major breakthroughs in the nineties. At the conference, held here in Hefei 20-24 October at the China University of Science and Technology, over 350 scientists and engineers representing over 60 R&D units attended, and 455 technical papers were published, of which 20 were specifically on superconductivity research.

**Fibre Optic Revolution for Telecom in China**

40100007 Beijing CHINA DAILY in English 21 Nov 91  
p 1

[Article by Xie Liangjun]

[Text] China is to co-operate with Japan and the United States to speed up construction of its first international submarine cable line in a bid to switch the domestic telecommunications network on to the global system.

Planners with the Ministry of Posts and Telecommunications revealed that the three countries are currently installing a 1,300-kilometre submarine cable between Shanghai and Kyushu in Japan.

The \$64.3 million project, which will link China's telecommunications cable network with the world, is due to be completed in 1993 when Chinese subscribers will have easier access to their overseas counterparts. The government also plans to complete five major fibre optic cables during the 1991-95 period in an attempt to facilitate long-distance telephone communications. The trunk lines would cost about 2 billion yuan (\$373 million) and link Beijing with China's other major cities.

The 4,200-kilometre Beijing-Shenyang-Harbin line will start construction next year with an investment of up to 600 million yuan (\$112 million), of which about \$50 million in loans is expected from Japan.

Ministry officials said the 2,600-kilometre Southern Coastal Trunk Line was already under construction at a cost of 400 million yuan (\$74.6 million). It will connect Shanghai, Hangzhou, Ningbo, Wenzhou, Fuzhou and Xiamen with Guangzhou and is expected to be completed by the end of 1992.

The Beijing-Tianjin-Jinan-Hefei-Shanghai fibre optic cable, which will cost 300 million yuan (\$56 million), is scheduled to begin construction next year for completion in the first half of 1993. The project will link six provincial capitals.

The Beijing-Hankou-Guangzhou line is expected to be completed in 1995 at a cost of 600 million yuan (\$112 million). The government hopes to attract overseas investment to ease the financial burden of this undertaking.

The State Planning Commission has approved installation of a Zhengzhou-Xi'an-Chengdu fibre optic cable during the Eighth Five-Year Plan period (1991-95). The government hopes to attract foreign government loans to partially cover the project.

The construction of fibre optic trunk lines and the installation of computerized telephone exchanges is on the top of the government's development agenda.

China started building such cables in the late 1970s. There are now 11,000 kilometres of domestic fibre optic lines. During the 1986-90 period, only one such trunk line, the Wuhan-Nanjing Line, was built.

Apart from major cables funded by the central government, provinces and autonomous regions have been encouraged to install inter- or intra-provincial fibre optic lines to ease logjams on existing local networks or to expand telecom capacity.

**Further Reports on Fiber Optic Communications****Nanjing-Tianjin Cable Construction Begun**

92P60054A Shanghai DIANXIN KUAIBAO  
[TELECOMMUNICATIONS INFORMATION]  
in Chinese No 9, Sep 91 p 26

[Article by Li Xiangbin [2621 4161 1755]: "Construction Begun on Nanjing-Tianjin Fiber Optic Cable Trunkline"]

[Summary] Construction has begun on the 1,050-km-long Nanjing-Tianjin fiber-optic cable trunkline. This line, which will cross Jiangsu, Shandong, and Hebei Provinces, will employ 24-fiber cable and will open up 8,000 circuits when first-phase construction is completed in summer 1992. The line will be linked with the Tianjin-Beijing and Nanjing-Shanghai trunklines to form a 1,580-km Beijing-Shanghai trunkline.

**Shanghai AT&T's State-of-the-Art Production Line Operational**

92P60054B Beijing ZHONGGUO DIANZI BAO  
[CHINA ELECTRONICS NEWS] in Chinese 18 Sep 91  
p 1

[Article by Xue Wen [5641 7186]: "Fiber-Optic Transmission Equipment Production Line Completed in Shanghai"]

[Summary] Construction on a state-of-the-art production line for making fiber-optic transmission equipment and PCM [pulse code modulation] digital multiplexing equipment was formally completed at Shanghai AT&T Communications Equipment Ltd. on 5 September and the line is now operational. Via advanced equipment imported from the United States and the Netherlands, Shanghai AT&T will be able to manufacture 16 different products, including 4,000 optoelectronic terminals per year, 1,000 for sale on the world market. Since March 1990, when the firm opened for business, it has won several contracts for providing high-capacity digital fiber-optic transmission equipment: the US\$30 million worth of contracts include a \$2 million contract for transmission equipment for the Shanghai-Nanjing MPT priority fiber-optic cable trunkline and \$19 million for three Beijing metropolitan network projects.

### **Petrochemical Corp. Completes First Integrated Network**

92P60054C Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 36, 18 Sep 91  
p 5

[Unattributed article: "Fushun Petrochemical Co. Completes Integrated Fiber-Optic Communications Network"]

[Summary] The domestic petrochemical industry has just gotten its first integrated fiber-optic network: the Fushun Petrochemical Corp.'s network, which can handle telephone, computer communications, TV program transmission, and other services, has been completed. The network will link the VAX-6410 computer in the corporation's computing center to its Petroleum Plant No. 1, its ethylene plant, and its acrylic fiber plant, all within a 5-km radius (maximum transmission range) of the computing center. BER is better than the  $10^{-9}$  standard. The network employs the BFMDL-1 time-division-multiplexing (TDM) fiber-optic terminals made by the Beijing Optical Communications Co.; these terminals provide a 64 kbps synchronous channel, a 9.6 kbps synchronous channel, and a 19.2 kbps asynchronous data channel.

### **Shanghai To Build FTTH CATV Network**

92P60054D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 37, 25 Sep 91  
p 2

[Article by Xiao Qiang [2556 1730]: "Nation To Begin Construction on Fiber Optic CATV in Shanghai Area's Jiading"]

[Summary] Fiber optic technology is now moving into the home (FTTH, or fiber-to-the-home), with the upcoming construction in the Shanghai area's Jiading Xian ("Science City") of the nation's first fiber-optic cable TV demonstration project. The overall plan, which recently formally passed expert appraisal, is divided into near-term, mid-term, and long-term segments. In the near-term (1992) and mid-term (1993) segments, 18,000 and 24,000 homes, respectively, will be wired; 88,000 homes should be wired by 1996. Fifteen TV programs (eventually expandable to 28) will be carried in the CATV network, with the Jiading Xian People's Broadcasting Station as the transmission center; a unidirectional 300 MHz transmission system will be used.

### **Nation's First Shallow-Sea Cable Completed**

92P60054E Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 29 Sep 91  
p 1

[Article by Li Qiongrui [2621 8825 3843] and Wang Shunli [3769 7311 0448]: "Nation's First Shallow-Sea Fiber Optic Cable Completed"]

[Summary] Construction on the nation's first shallow-sea fiber optic cable project, on which research and trial manufacturing was undertaken by MMEI's Institute 8, has now been formally completed, with the expert accreditation of the cable in Beijing on 17 September. The new cable has an unrepeated transmission range of several tens of kilometers; optical loss does not exceed 0.5 dB/km. The "steel-like" cable is designed to resist 15 tons of pulling force.

### **III-V-Group 2-5-Micron IR Receiver Developed**

92P60054F Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 6 Oct 91  
p 3

[Article by Hu Wen [3337 2429]: "Infrared Optical Communications Receiver Developed"]

[Summary] An NSFC-funded project entitled "III-V-Group 2-5  $\mu$ m Infrared Fiber Optic Communications Receiver" has been completed by the CAS Shanghai Institute of Metallurgy. The newly developed InAsSb/InAs high-speed detector, the first such device developed domestically, has a response peak wavelength and ultra-long-wave fiber-optic window matching that fully meet requirements for ultra-long-wave fiber optic communications.

### **First 60-km Unrepeated Bundle-Tube Overhead Cable**

92P60054G Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 12 Oct 91 p 1

[Article by Zhang Yangcan [1728 7122 3503] and Yang Dezheng [2799 1795 2398]: "Nation's First 60-km Unrepeated Bundle-Tube-Type Overhead Fiber Optic Cable Operational"]

[Summary] The nation's first 60-kilometer-unrepeated bundle-tube-type fiber optic cable (Shuijiashu to Bengbu segment) became formally operational on 9 October. This four-fiber DS-3 [34 Mbps] digital transmission system, 60.5 km in length, was designed by the Ministry of Railways No. 4 Survey and Design Institute; all of the fiber optic cable and optoelectronic terminals are domestically made. This cable links Bengbu, Shangqiu, Fuyang, Huainan, Bozhou [i.e., Bo Xian], and Zhengzhou into a communications network.

### **Zhengzhou-Wuchang Railway Communications Line Operational**

92P60079A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 6 Nov 91 p 1

[Article by Zhou Honggui [0719 1347 6311]: "Zhengzhou-Wuchang Fiber Optic Communications Line Operational"]

[Summary] The national railway system's longest fiber-optic communications line—the Zhengzhou-Wuchang

long-distance automated communications line—was formally opened on 5 November. This 572-km-long line, a segment of an advanced Beijing-Guangzhou line currently under construction, has a capacity of 1,920 telephone circuits, and represents a 500-percent increase over the previous number of lines between the two cities.

#### **Nanjing-Shanghai-Fuzhou-Guangzhou Line Begun**

92P60079B Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 43, 6 Nov 91 p 1

[Article by Li Xiangbin [2621 4161 1755]: "Construction Begun on Fiber-Optic Cable Trunkline To Connect Nanjing, Shanghai, Fuzhou, and Guangzhou; Ground-Breaking in Zhejiang Area Is First"]

[Summary] Construction of a 2,900-km-long Nanjing-Shanghai-Fuzhou-Guangzhou fiber-optic cable line, the first Eighth 5-Year Plan trunkline fiber-optic cable project and the longest such project to be built in China, has begun, with first ground-breaking taking place in the Zhejiang area. The overall project has been funded with a gross investment of 417.08 million yuan. After its completion, the new line will be joined with the Nanjing-Wuhan fiber-optic cable trunkline to form a major digital fiber-optic network covering the nation's southeast and southern seacoast areas. It can also be joined to the now-being-upgraded Beijing-Guangzhou fiber-optic cable which, together with the Nanjing-Wuhan line, would form a network covering the east, south, southwest, and north.

#### **Beijing TDM/CDMA Satcom Network Certified**

92P60055A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 28 Sep 91 p 1

[Article by Gu Xiaoxiang [7357 1321 5980]: "Beijing Realizes New Achievement in Satellite Communications Networking"]

[Summary] The TDM/CDMA [time-division multiplexing/code-division multiple access] satellite communications network developed by Beijing University's Radio and Electronics Department recently passed technical appraisal. This satcom network consists of one central earth station and 500-1,000 VSAT [very-small-aperture satellite terminal] user earth stations. The network, which permits telephone and data communications from mountainous and remote desert areas, meets late-eighties international standards.

#### **International-Standard C-Band Unified TT&C System Equipment Certified**

92P60067A Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 25 Oct 91 p 1

[Article by Tang Jianwei [0781 1696 0251]: "Domestic Geosynchronous Satellite Telemetry, Tracking and Control Technology at Internationally Advanced Level"]

[Summary] Recently developed international C-band unified telemetry, tracking and control (TT&C) system equipment passed the appraisal held by NDSTIC and by the CHINATRON Corp. on 9 October in Chengdu, indicating that the nation's TT&C technology has reached an internationally advanced level. This domestically made equipment, developed by MMEI's Institutes 10, 39, and 54 and by the Ministry of Aerospace Industry's Institute 704, is China's third-generation large microwave unified TT&C system for the various orbital segments associated with the launch of a domestic geosynchronous satellite, and can as well provide TT&C cooperative services for foreign clients whose TT&C systems operate in the same frequency band. The technical specialists at the certification appraised the equipment's principal technical performance indicators as meeting late-eighties international standards. The entire development project was completed in just over two years, since the contract was signed in August 1989.

### **PHYSICS**

#### **HL-1 Tokamak Realizes L-H Conversion**

92P60056A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 18 Sep 91 p 2

[Article by Liu Xiaoge [0491 1420 7245]: "Breakthrough Achieved in Leading-Edge Research on Controlled Nuclear Fusion"]

[Summary] In summer this year, researchers at the nuclear industry's Southwest Nuclear Physics Institute (SNPI) achieved a major breakthrough in magnetic confinement fusion research—they improved and raised the HL-1 tokamak's confinement potential and achieved the critical L-H (low-energy to high-energy) conversion. The renovations involve experimental use of bias electrodes. At present, the only two tokamaks worldwide that use bias electrodes to generate border polarities for high confinement ability are the U.S.'s CCT apparatus and Germany's TEXTOR apparatus. In the experiment conducted this summer, the SNPI researchers simultaneously experimented with the positive bias electrodes and the air-operated diaphragm aperture to achieve the high energy level.

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